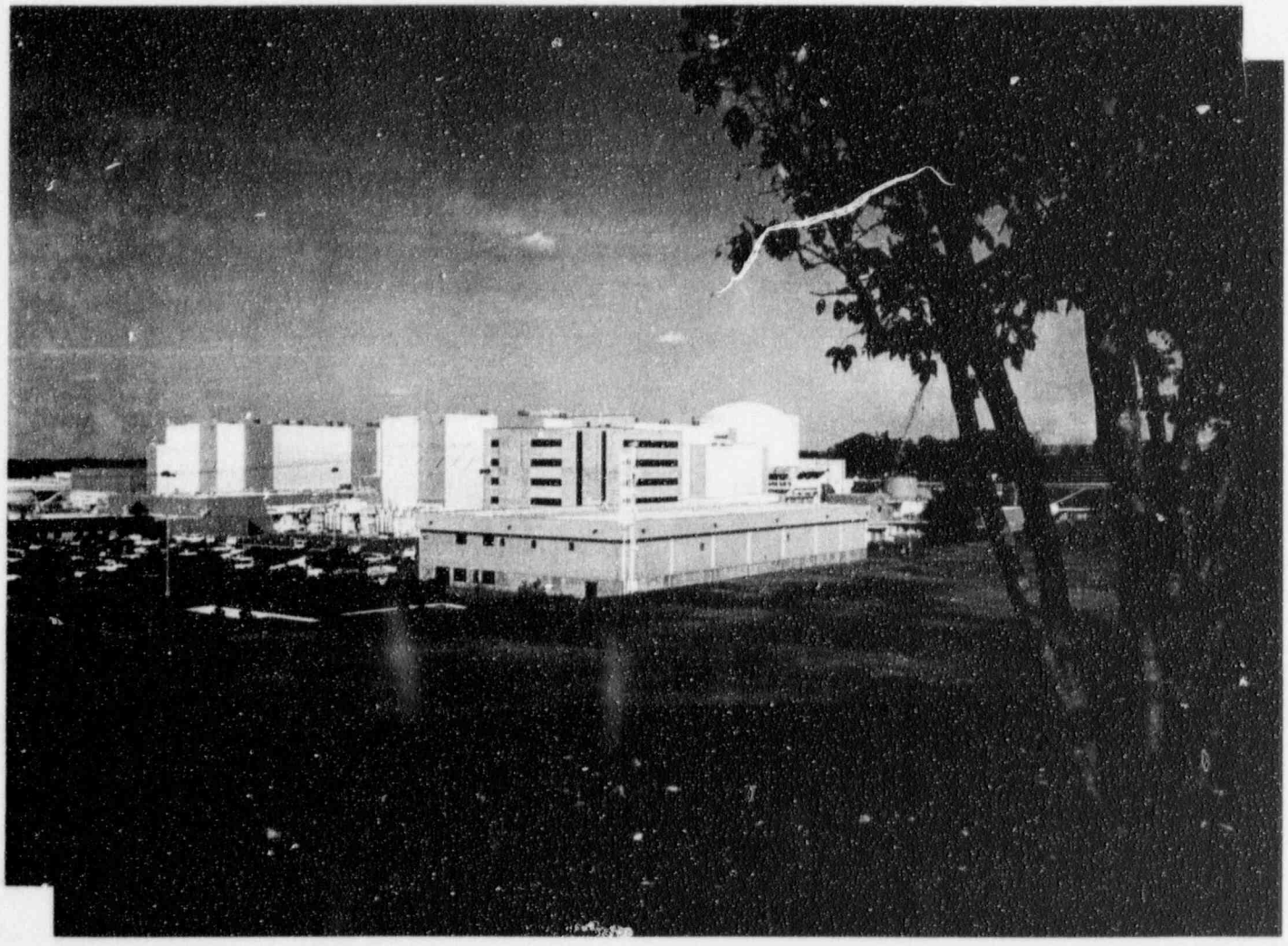
DUKE POWER

Catawba Nuclear Station
Units 1 and 2



Annual Radiological Environmental Operating Report 1995

DUKE POWER

Catawba Nuclear Station
Units 1 and 2

Annual Radiological Environmental Operating Report 1995

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

for

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
Units 1 and 2

January 1 - December 31

1995

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LIST OF ACRONYMS

Acronyms and their interpretations used in this report (displayed alphabetically)

ACRONYM	DEFINITION
BW	BiWeekly
C	Control
CL	Critical Level
CNS	Catawba Nuclear Station
DEHNR	Department of Environmental Health and Natural Resources
DHEC	Department of Health and Environmental Control
EPA	Environmental Protection Agency
FSAR	Final Safety Analysis Report
LLD	Lower Limit of Detection
M	Monthly
MDA	Minimum Detectable Activity
mrem	millirem
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
pCi/kg	picocurie per kilogram
pCi/l	picocurie per liter
pCi/m3	picocurie per cubic meter
Q	Quarterly
REMP	Radiological Environmental Monitoring Program
SA	Semiannually
SLCs	Selected Licensee Commitments
SM	Semimonthly
TECH SPECs	Technical Specifications
TLD	Thermoluminescent Dosimeter
uCi/ml	microcurie per milliliter
W	Weekly

1.0 EXECUTIVE SUMMARY

This Annual Radiological Environmental Operating Report describes the Catawba Nuclear Station Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 1995.

Included are the identification of sampling locations, descriptions of environmental sampling and analysis procedures, comparisons of present environmental radioactivity levels and pre-operational environmental data, comparisons of doses calculated from environmental measurements and effluent data, analysis of trends in environmental radiological data as potentially affected by station operations, and a summary of environmental radiological sampling results. Quality assurance practices, sampling deviations, unavailable samples, and program changes are also discussed.

Sampling activities were conducted as prescribed by Selected Licensee Commitments (SLC's). Required analyses were performed and detection capabilities were met for all samples as required by SLC's. Supplemental analyses were performed for some media for additional information. Nine-hundred seven samples were analyzed comprising 6750 test results in order to compile data for the 1995 report. Based on the annual land use census, the current number of sampling sites for Catawba Nuclear Station is sufficient.

Concentrations observed in the environment in 1995 for station related radionuclides were generally within the ranges of concentrations observed in the past. Inspection of data showed that radioactivity concentrations in surface water, drinking water, shoreline sediment, and fish are higher than the activities reported for samples collected prior to the operation of the station. Measured concentrations were not higher than expected, and all positively identified measurements were within limits as specified in SLC's. Additionally, environmental radiological monitoring data is consistent with effluents introduced into the environment by plant operations. The total body dose estimated to the maximum exposed member of the public as calculated by environmental sampling data, excluding TLD results, was 4.19E-01 mrem for 1995. It is therefore concluded that station operations has had no significant radiological impact on the health and safety of the public or the environment.

2.0 INTRODUCTION

2.1 SITE DESCRIPTION AND SAMPLE LOCATIONS

Duke Power Company's Catawba Nuclear Station is a two-unit facility located on the shore of Lake Wylie in York County, South Carolina. Each of the two essentially identical units employs a pressurized water reactor nuclear steam supply system furnished by Westinghouse Electric Corporation. Each generating unit is designed to produce a net electrical output of approximately 1145 MWe. Units 1 and 2 achieved initial criticality on January 7, 1985, and May 8, 1986, respectively.

Condenser cooling is accomplished utilizing a closed system incorporating cooling towers, instead of using lake water directly. Liquid effluents are released into Lake Wylie via the station discharge canal and are not accompanied by the large additional dilution water flow associated with "once-through" condenser cooling. This design results in greater radionuclide concentrations in the discharge canal given comparable liquid effluent source terms.

The CNS Radiological Environmental Monitoring Program (REMP) sampling locations are summarized in Tables 2.1-A and 2.1-B. Table 2.1-A lists the environmental Thermoluminescent Dosimeter (TLD) locations. Table 2.1-B lists all other sampling locations. The REMP sampling and analysis procedures are summarized in Appendix A.

A map depicting the site and area within one mile of CNS can be found in Figure 2.1-1. An area map encompassing a ten mile radius from the station can be found in Figure 2.1-2.

Figures 2.1-1, 2.1-2, and 2.1-3 are maps depicting the specific positions of all REMP sampling locations. The location numbers shown on these maps correspond to those listed in Tables 2.1-A and 2.1-B. Figure 2.1-1 comprises all sample locations within one mile of CNS. Figure 2-D comprises all remaining locations. Figure 2.1-3 identifies location 208 (discharge canal) shoreline sediment (1S, 2S, and 3S) and bottom sediment (1M, 2M, and 3M) sampling points. Of these six sediment samples, only shoreline sediment at location 208-1S is required by CNS Final Safety Analysis Report (FSAR); the remaining five are supplemental samples first collected during 1986.

2.2 SCOPE AND REQUIREMENTS OF ENVIRONMENTAL MONITORING PROGRAM

An environmental monitoring program has been in effect at Catawba Nuclear Station since 1981, four years prior to operation of Unit 1 in 1985. The preoperational program provides data on the existing environmental radioactivity levels for the site and vicinity which may be used to determine whether increases in environmental levels are attributable to the station.

The operational program provides surveillance and backup support of detailed effluent monitoring which is necessary to evaluate the significance, if any, of the contributions to the existing environmental radioactivity levels that result from station operation.

This monitoring program is based on NRC guidance as reflected in Selected Licensee Commitments Manual, with regard to sample media, sampling locations, sampling frequency and analytical sensitivity requirements. Indicator and control locations were established for comparison purposes to distinguish radioactivity of station origin from natural or other "man-made" environmental radioactivity. The environmental monitoring program also verifies projected and anticipated radionuclide concentrations in the environment and related exposures from releases of radionuclides from Catawba Nuclear Station. This program satisfies the requirements of Section IV.B.2 of Appendix I to 10CFR50 and provides surveillance of all appropriate critical exposure pathways to man and protects vital interests of the company, public and state and federal agencies concerned with the environment. Reporting levels for activity found in environmental samples are listed in Table 2.2-A. Table 2.2-B lists the REMP analysis and frequency schedule.

The Annual Land Use Census, required by Selected Licensee Commitments, is performed to ensure that changes in the use of areas at or beyond the site boundary are identified and that modifications to the Radiological Environmental Monitoring Program are made if required by changes in land use. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10CFR50. Results are shown in Table 3.12-A.

Participation in an approved Interlaboratory Comparison Program as required by Selected Licensee Commitments provides for independent checks on the precision and accuracy of measurements of radioactive material in REMP sample matrices. Such checks are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10CFR50. A summary of the results obtained as part of this comparison program are in Section 5 of this annual report.

2.3 STATISTICAL AND CALCULATIONAL METHODOLOGY

2.3.1 ESTIMATION OF THE MEAN VALUE

There was one (1) basic statistical calculation performed on the raw data resulting from the environmental sample analysis program. The calculation involved the determination of the mean value for the indicator and the control samples for each sample medium. The mean is a widely used statistic. This value was used in the reduction of the data generated by the sampling and analysis of the various media in the Environmental Monitoring Program. The following equation was used to estimate the mean (reference 6.8):

$$\bar{x} = \frac{\sum_{i=1}^{N} x_i}{N}$$

Where:

$\bar{x}$ = estimate of the mean,
i = individual sample,
N = total number of samples with a net activity (or concentration)
x_i = net activity (or concentration) for sample i.

NOTE: "Net activity (or concentration)" is the activity (or concentration) determined to be present in the sample. No "Minimum Detectable Activity", "Lower Limit of Detection", "Less Than Level", or negative activities or concentrations are included in the calculation of the mean.

2.3.2 LOWER LEVEL OF DETECTION, MINIMUM DETECTABLE ACTIVITY, AND CRITICAL LEVEL

The Lower Level of Detection (LLD), Minimum Detectable Activity (MDA), and Critical Level (CL) are used throughout the Environmental Monitoring Program.

LLD - The LLD, as defined in the Selected Licensee Commitments Manual is the smallest concentration of radioactive material in a sample that will yield a net count, above the system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD is an *a priori* lower limit of detection. The actual LLD is dependent upon the standard deviation of the background counting rate, the counting efficiency, the sample size (mass or volume), the radiochemical yield and the radioactive decay of the sample between sample collection and counting. The "required" LLD's for each sample medium and selected radionuclides are given in the Selected Licensee Commitments and are listed in Table 2.2-C.

MDA - The MDA may be thought of as an "actual" LLD for a particular sample measurement remembering that the MDA is calculated using a sample background instead of a system background.

CL - The CL is defined as the net count rate which must be exceeded before a sample is considered to contain any measurable activity above the background.

2.3.3 TREND IDENTIFICATION

One of the purposes of an environmental monitoring program is to determine if there is a buildup of radionuclides in the environment due to the operation of the nuclear station. This is traditionally done by looking at historical data (including preoperational data) and determining if a trend exists. Trends, if they exist, may be either positive or negative. Since nuclear reactor operations do not remove radioactivity from the surrounding environment, a negative trend in a particular radionuclide's concentration in an environmental medium does not indicate that reactor operations are removing radioactivity from the environment but that reactor operations are not adding that radionuclide to the environment in quantities exceeding the preoperational level and that the normal removal processes (radioactive decay, deposition, resuspension, etc.) are influencing the concentration.

Identifying a trend is only useful for the time periods where the discharge from the nuclear plant is relatively stable and no other sources of radioactivity are present. Substantial increases or decreases in the amount of a particular radionuclide's release from the nuclear plant will greatly affect the resulting environmental levels; therefore, a knowledge of the release of a radionuclide from the nuclear plant is necessary to completely interpret the trends, or lack of trends, determined from the environmental data. Other factors that may affect environmental levels of radionuclides include prevailing weather conditions (periods of drought or heavier than normal precipitation), construction in or around either the nuclear plant or the sampling location, addition or deletion of other sources of radioactive materials (such as the Chernobyl accident), etc.. Some of these factors may be obvious while others are sometimes unknown to the plant personnel.

The change in the method of calculating the mean (using only net positive results incorporated in 1987) will also affect the apparent trends.

Because of the above considerations, how trends are identified will include some judgment by plant personnel on the factors affecting environmental levels.

2.3.4 TEST STATISTIC

In some cases, we would not expect to observe a buildup of radionuclides in the environment, but instead would expect to see a measurable increase in levels over a short duration. This is the case for direct radiation measurements, where the radiation level is measured over a finite period and may be dependent upon whether plant discharges were occurring at that time or not. In this case, the correlation coefficient is not a sufficient indicator of whether effluents are having an impact on the environment, since there is no bioaccumulation. Another test is needed to give us a meaningful interpretation of the data.

The statistic that compares the means from two sets of measurements to determine if there is a statistically significant difference is called the test statistic, or t-statistic, and is calculated as follows (reference 6.7):

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where:

$\overline{X_1}$ = the mean value of the first set of measurements

$\overline{X_2}$ = the mean value of the second set of measurements

S_p = the common variance of the two sets of measurements

$S_p = \sqrt{S_p^2}$

Where:

$$S_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

n_1 = the number of measurements in the first data set

n_2 = the number of measurements in the second data set

s_1 = the sample variance of the first data set

s_2 = the sample variance of the second data set

The calculated value of the test statistic is then compared to expected values of the test statistic tabulated based on the number of measurements taken and the degree of confidence required for the results. The calculated value of the test statistic will be compared to the expected value at the 95% confidence level. A positive value occurs (the two sets of data are significantly different) when the absolute value of the calculated test statistic exceeds the absolute value of the expected tabulated value.

Due to the existence of naturally occurring differences in background radiation levels over time (as a result of solar cycles and other meteorological phenomena) and systematic errors due to instrument variability, ratios of measurements can be used to calculate the t-statistic instead of individual measurements. By using ratios, biases associated with the measurement process are minimized and allow us to more accurately compare results from one year to the next. Specifically, in the case of TLD

measurements, the inner ring of TLD results is ratioed with the outer ring of TLD measurements in a given year and the ratio for one year is compared to the ratio for another year.

As with other environmental samples, outside factors may affect the results observed and the resulting trends identified. Therefore, the significance of trends will be based in part on judgment of plant personnel familiar with the factors affecting environmental levels, as well as the statistical results.

TABLE 2.1-A
CATAWBA RADIOLOGICAL MONITORING PROGRAM
SAMPLING LOCATIONS

(TLD SITES)

Site #	Location	Distance	Sector	Site #	Location	Distance	Sector
200	SITE BOUNDARY	0.6 mi	NNE	233	4-5 MILE RADIUS	3.9 mi	ENE
201	SITE BOUNDARY	0.5 mi	NE	234	4-5 MILE RADIUS	4.5 mi	E
202*	SITE BOUNDARY	0.6 mi	E	235	4-5 MILE RADIUS	3.9 mi	ESE
203	SITE BOUNDARY	0.4 mi	ESE	236	4-5 MILE RADIUS	4.3 mi	SE
204	SITE BOUNDARY	0.5 mi	SSW	237	4-5 MILE RADIUS	4.8 mi	SSE
205	SITE BOUNDARY	0.3 mi	SW	238	4-5 MILE RADIUS	4.0 mi	S
206	SITE BOUNDARY	0.7 mi	WNW	239	4-5 MILE RADIUS	4.5 mi	SSW
207	SITE BOUNDARY	0.9 mi	NNW	240	4-5 MILE RADIUS	4.1 mi	SW
212	SPECIAL INTEREST	3.3 mi	E	241	4-5 MILE RADIUS	4.6 mi	WSW
217	CONTROL	10.3 mi	SSE	242	4-5 MILE RADIUS	4.6 mi	W
222	SITE BOUNDARY	0.7 mi	N	243	4-5 MILE RADIUS	4.4 mi	WNW
223	SITE BOUNDARY	0.6 mi	E	244	4-5 MILE RADIUS	4.0 mi	NW
224*	SITE BOUNDARY	0.6 mi	ESE	245	4-5 MILE RADIUS	4.1 mi	NNW
225	SITE BOUNDARY	0.7 mi	SE	246	SPECIAL INTEREST	7.8 mi	ENE
226	SITE BOUNDARY	0.5 mi	S	247	CONTROL	7.3 mi	ESE
227	SITE BOUNDARY	0.5 mi	WSW	248	SPECIAL INTEREST	6.6 mi	S
228	SITE BOUNDARY	0.6 mi	W	249	SPECIAL INTEREST	8.1 mi	S
229	SITE BOUNDARY	0.8 mi	NW	250	SPECIAL INTEREST	10.4 mi	WSW
230	4-5 MILE RADIUS	4.4 mi	N	251	CONTROL	9.7 mi	WNW
231	4-5 MILE RADIUS	4.2 mi	NNE	255**	SITE BOUNDARY	0.6 mi	ENE
232	4-5 MILE RADIUS	4.1 mi	NE	256**	SITE BOUNDARY	0.6 mi	SSE

* Deleted 09/14/89
** Added 09/14/89

TABLE 2.1-B

CATAWBA RADIOLOGICAL MONITORING PROGRAM
SAMPLING LOCATIONS

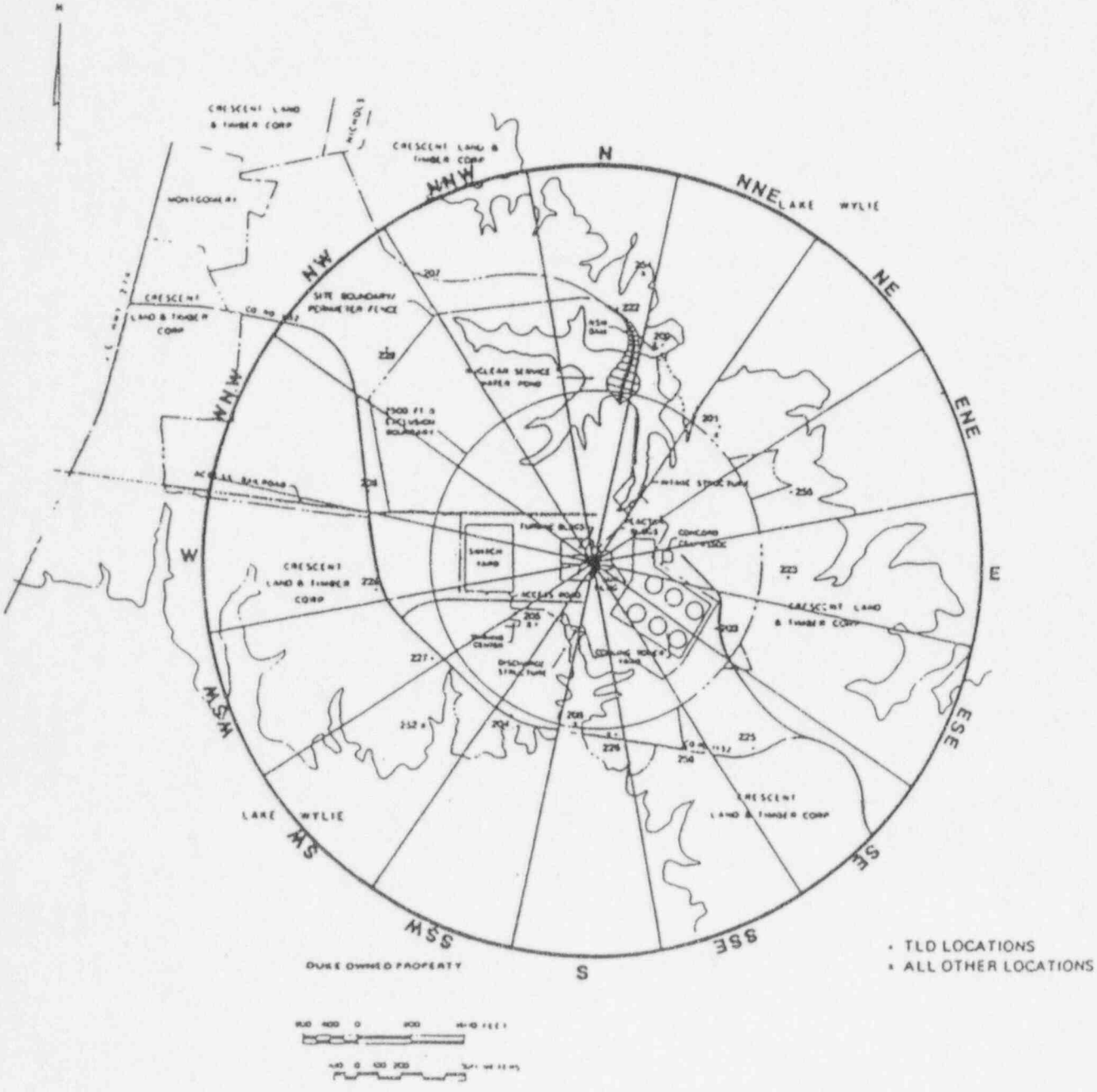
TABLE 2.1-B CODES			
W	Weekly	SM	Semimonthly
BW	BiWeekly	Q	Quarterly
M	Monthly	SA	Semiannually
C	Control		

Site #	Location Description	Air Rad. & Part.	Surface Water	Drinking Water	Shore line Sed.	Food Products (a)	Fish	Milk	Broad Leaf Veg. (b)	Ground Water
200	Site Boundary (0.6 mi NNE)	W							M	
201	Site Boundary (0.5 mi NE)	W							M	
205	Site Boundary (0.3 mi SW)	W								
208	Discharge Canal (0.5 mi S)		BW		SA		SA			
209	Dairy (6.0 mi SSW)							SM		
210	Ebenezer Access (2.3 mi SE)				SA					
211	Wylie Dam (4.0 mi ESE)		BW							
212	Tega Cay (3.3 mi E)	W								
214	Rock Hill Water Supply (7.3 mi SE)			BW						
215	River Pointe - Hwy 49 (4.2 mi NNE) CONTROL		BW		SA					
216	Hwy 49 Bridge (4.0 mi NNE) CONTROL						SA			
217	Rock Hill Substation (10.3 mi SSE) CONTROL	W								
218	Belmont Water Supply (13.4 mi NNE) CONTROL			BW					M	
219	Dairy (5.7 mi SW)							SM		
221	Dairy (14.5 mi NW) CONTROL							SM		
226	Site Boundary (0.5 mi S)								M	
252	Residence (0.7 mi SW)									Q
253	Irrigated Gardens (Downstream within 5 mile radius)					M(a)				
254	Residence (0.8 mi N)									Q

(a) During Harvest Season
(b) When Available

Figure 2.1-1

SAMPLING LOCATIONS MAP (ONE MILE RADIUS)




N
NNW
NNE
10 MILE
5 MILE
221
218 (IN B
230
231
245
215
216
232
244
243
233
242
212
241
210
235
240
236
239
220
219
250
209
248
SW
S

(MONT)

● TLD LOCATIONS

▲ ALL OTHER LOCATIONS

SCALE OF MILES

1 0 1 2 3 4

LEGEND

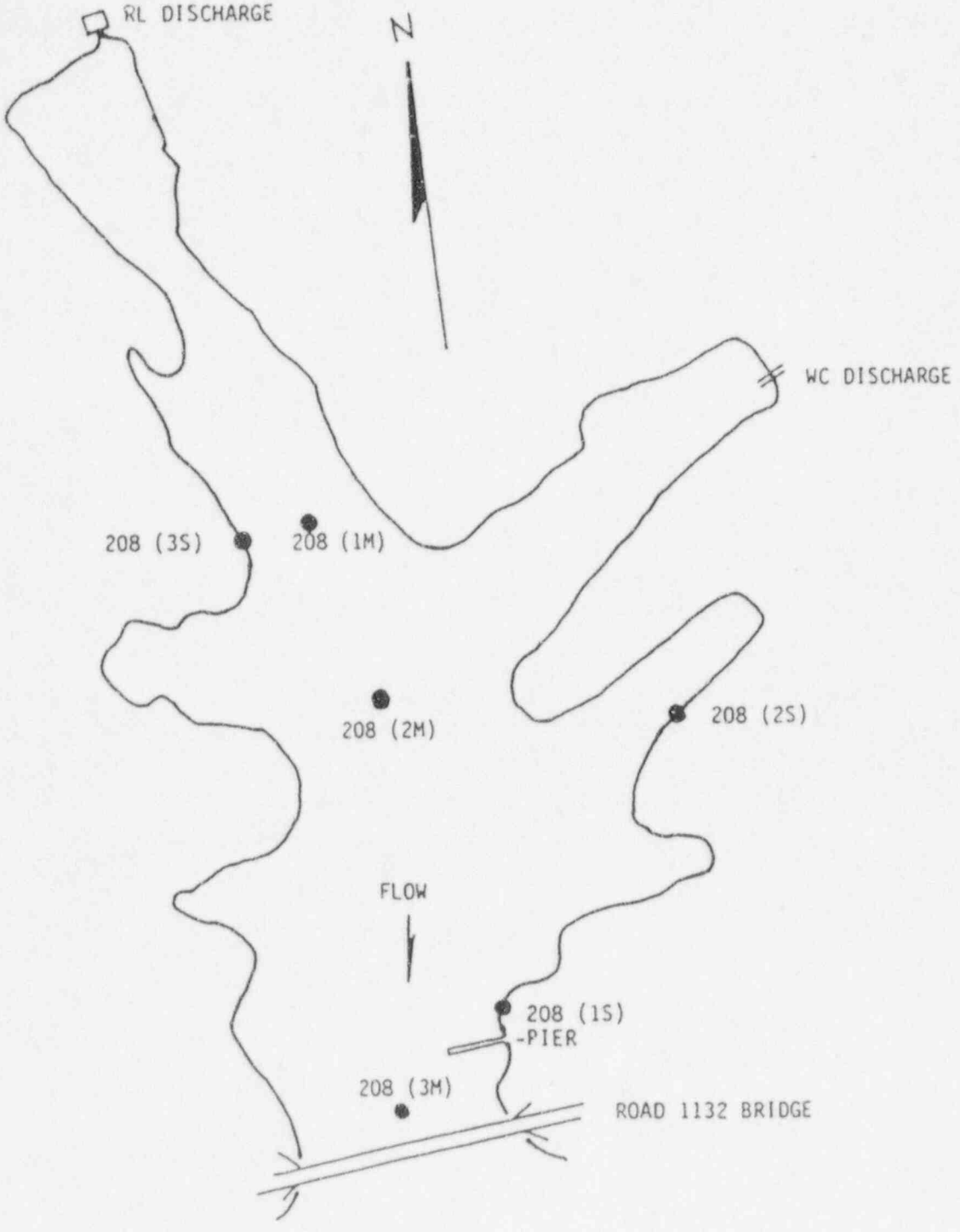
PRIMITIVE OR UNIMPROVED ROAD
GRADED AND DRAINED ROAD
SOIL, GRAVEL OR STONE SURFACED ROAD
HARD SURFACED ROAD
4 LANE UNDIVIDED HIGHWAY
DIVIDED HIGHWAY
HIGHWAY WITH FRONTAGE ROADS
FULL CONTROL ACCESS
FEDERAL AID INTERSTATE ROAD
FEDERAL AID PRIMARY ROAD
FEDERAL AID SECONDARY ROAD
FEDERAL AID URBAN
NON-SYSTEM ROAD
PROJECTED LOCATION
INTERSECTION DISTANCE
TRAFFIC CIRCLE
HIGHWAY INTERCHANGE
DETAILED HIGHWAY INTERCHANGE
INTERSTATE HIGHWAY
U.S. NUMBERED HIGHWAY
N.C. NUMBERED HIGHWAY
SECONDARY ROAD NUMBER
UNDERGROUND CABLE
RAILROAD, ANY NUMBER OF TRACKS USED BY SINGLE OPERATING COMPANY
RAILROAD, ANY NUMBER OF TRACKS USED BY MORE THAN ONE OPERATING COMPANY ON SAME OR ADJACENT RIGHTS-OF-WAY
RAILROAD STATION
GRADE CROSSING
UNDERPASS
OVERPASS
RAILROAD TUNNEL
ARMY, NAVY OR MARINE CORPS FIELD
COMM. OR MUNICIPAL AIRPORT
MARKED AUXILIARY FIELD
HANGAR ON FIELD "B" IN SYMBOL
DOCK, PIER OR LANDING
FREE OR TOLL FERRY
LIGHT, NAUTICAL
LIGHTHOUSE
COAST GUARD STATION
CANAL
NARROW STREAM
WIDE STREAM
DAM WITH LOCK
DAM
RESERVOIR, POND OR LAKE
PROMINENT PEAK, NUMERALS INDICATE ELEVATION
ROAD THROUGH MOUNTAIN PASS
HIGHWAY BRIDGE OVER 20 FT.
DRAW SPAN ON BRIDGE
HIGHWAY TUNNEL
FORD
STATE LINE
COUNTY LINE
CITY LIMITS
RESERVATION OR PARK BOUNDARY
MINT AREA
DELIMITED AREA, POPULATION EST.
COUNTY SEAT
OTHER TOWNS AND VILLAGES
TRIANGULATION STATION
INCORPORATED CITY OR VILLAGE, CRIMINALIZED
SCHOOL
CHURCH
CHURCH WITH CEMETERY
CEMETERY
HOSPITAL
CORRECTIONAL OR PENAL INSTN.
HIGHWAY GARAGE OR MAINT. YARD
HIGHWAY DIV. OR DIST. OFFICE
WEIGHT STATION
PATROL STATION
REST AREA
MONUMENT - SMALL HISTORICAL MRK

CATAWBA NUCLEAR STATION

FIGURE 2.1-2
SAMPLING LOCATIONS MAP
(TEN MILE RADIUS)

Figure 2.1-3

SAMPLING LOCATIONS MAP (DISCHARGE CANAL)



CATAWBA NUCLEAR STATION DISCHARGE CANAL

TABLE 2.2-A

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Water (pCi/liter)	Air Particulates or Gases (pCi/m^3)	Fish (pCi/kg-wet)	Milk (pCi/liter)	Food Products (pCi/kg-wet)
H3	20,000 [a]				
Mn54	1,000		30,000		
Fe59	400		10,000		
Co58	1,000		30,000		
Co60	300		10,000		
Zn65	300		20,000		
Zr-Nb-95	400				
I131	2	0.9		3	100
Cs134	30	10	1,000	60	1,000
Cs137	50	20	2,000	70	2,000
Ba-La-140	200			300	

(a) NOTE: *If no drinking water pathway exists, a value of 30,000 pCi/liter may be used.*

TABLE 2.2-B

REMP ANALYSIS FREQUENCY

SAMPLE MEDIUM	ANALYSIS SCHEDULE	GAMMA ISOTOPIC	TRITIUM	LOW LEVEL I-131	GROSS BETA	TLD
Air Radioiodine and Particulates	Weekly	X			X	
Direct Radiation	Quarterly					X
Surface Water	Monthly Composite	X				
	Quarterly Composite		X			
Drinking Water	Biweekly			X		
	Monthly Composite	X			X	
	Quarterly Composite		X			
Shoreline Sediment	Semiannually	X				
Milk	Semimonthly	X		X		
Fish	Semiannually	X				
Broadleaf Vegetation	Monthly (when available)	X				
Food Products	Monthly (during harvest season)	X				

TABLE 2.2-C

LOWER LIMIT OF DETECTION (LLD)
CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

Analysis	Water (pCi/liter)	Air Particulates or Gases (pCi/m^3)	Fish (pCi/kg-wet)	Milk (pCi/liter)	Food Products (pCi/kg-wet)	Sediment (pCi/kg-dry)
Gross Beta	4	0.01				
H3	2000 [a]					
Mn54	15		130			
Fe59	30		260			
Co58, 60	15		130			
Zn65	30		260			
Zr-Nb-95	15					
I131	1 [b]	0.07		1	60	
Cs134	15	0.05	130	15	60	150
Cs137	18	0.06	150	18	80	180
Ba-La-140	15			15		

(a) *If no drinking water pathway exists, a value of 3000 pCi/liter may be used.*
(b) *If no drinking water pathway exists, the LLD of gamma isotopic analysis may be used.*

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DISCUSSION, INTERPRETATION, AND TRENDING OF RESULTS

In addition to the "required" sampling and analyses described in CNS Selected Licensee Commitments Table 16.11-7, the following "supplemental" measures were taken during 1995. These supplemental measures were first adopted during 1986 to better assess the impact of CNS operations on the environment in a more timely and reliable manner:

1) Shoreline sediment (requiring collection at only one point along the CNS discharge canal (Location 208-1S) was collected at three points (Locations 208-1S, 208-2S and 208-3S).

2) Shoreline sediment (requiring collection semiannually) was collected quarterly. The first and third quarter samples from Locations 208-1S, 210 and 215 were considered to be the required samples and all remaining samples were considered supplemental.

3) Fish (requiring collection from Locations 208 and 216 semiannually) were collected quarterly. This year the second and fourth quarter samples were considered to be the required samples and the first and third quarter samples were considered supplemental.

4) Bottom sediment (not requiring collection) was collected quarterly at CNS Discharge Canal Locations 208-1M, 208-2M, and 208-3M. These were considered to be supplemental samples.

Summary tables containing 1995 information required by Technical Specification Administrative Control 6.9.1.6 for each required REMP sample type, can be found in Appendix B. These summary tables are based upon required sample results and supplemental sample results.

All deviations from the sampling and analytical requirements of Selected Licensee Commitments Table 16.11-7 which occurred during 1995, are addressed in Appendices C and D, respectively. For all 1995 REMP samples collected, required as well as supplemental, the reporting level limitations of Selected Licensee Commitments Table 16.11-7 were not exceeded. For REMP analyses, the LLD requirements of Selected Licensee Commitments Table 16.11-8 were met for

all required and supplemental samples. The required reporting levels and LLD capabilities for REMP samples are listed in Tables 2.2-A and 2.2-C.

Selected Licensee Commitments Table 16.11-7 (included as Table 2.2-A) provides reporting levels, as a function of sample type and radionuclide. If sample radionuclide activity exceeds 100% of reporting level (when summed over all detected radionuclides having a reporting level for the applicable sample type, and when the sums are averaged by location over the applicable calendar quarter), a special report must be submitted to the Nuclear Regulatory Commission.

All 1995 maximum percent of reporting level values were well below the 100% action level. The highest value reached during 1995 was 53.2%, for surface water tritium collected during fourth quarter at CNS discharge canal Location 208.

Selected Licensee Commitments Section 16.11-13 addresses the actions to be taken when radionuclides other than the thirteen radionuclides listed are detected in REMP samples. The occurrences of these radionuclides are the result of CNS liquid effluents which contained the radionuclides.

The Nuclear Data ND6620 gamma spectroscopy system (which was used to analyze REMP samples collected during 1984, 1985, 1986, and most of 1987) was replaced by the Nuclear Data ND9900 gamma spectroscopy system on September 1, 1987. When the ND6620 system was used to analyze samples prior to September 1, 1987, a small but steady percentage (approximately five percent) of measurements for most of the thirteen radionuclides listed in technical specifications, yielded detectable low-level activity, even when the presence of such activity was highly unlikely as for control location samples and preoperational samples collected during 1984. This phenomenon has not occurred using the ND9900 system, thus ending this trend and suggesting that the ND6620 system may have been vulnerable to false-positive results, possibly due to the method by which it estimated net activity even when its peak search routine failed to detect a peak.

This attribute must be considered when trending and comparing recent REMP results to those generated during the preoperational period and the operational period through August, 1987.

All 1995 REMP analysis results were reviewed in order to detect and identify any significant trends. Many sources of information were examined to accomplish this and the resultant trending observations are included in Parts 3.1 through 3.11. Quarterly REMP verification reports were generated in order to track commitment requirements, and these reports were also used to evaluate potential trends.

3.1 AIRBORNE RADIOIODINES AND PARTICULATES

3.1.1 RADIOIODINES

During 1995, 258 radioiodine samples were analyzed, 206 from the four indicator locations and 52 from the control location.

The term "airborne radioiodines" is used throughout this report to generically categorize sample results for the air charcoal cartridge filter. Radioactive iodines and other halogens are the only radionuclides (other than some which occur naturally) normally expected to be detected in these REMP samples. For the purpose of this report, the term "airborne radioiodines" refers to any and all radionuclides reported in REMP air charcoal cartridge sample results, not just radioiodines.

K-40 and Be-7 which occur naturally, were routinely detected in REMP charcoal cartridge samples collected during 1995. Cs-137 activity was present on one cartridge, but not on the particulate filter. This was determined to be inherent in the charcoal and was not included for trending purposes.

3.1.2 PARTICULATES

During 1995, 258 particulate filter samples were analyzed, 206 from the indicator locations and 52 from the control location.

Be-7 which occurs naturally, was routinely detected in REMP airborne particulate filter samples collected during 1994. K-40 was occasionally detected in these samples. No other radionuclides were detected in any 1995 airborne particulate filter samples. These results were consistent with 1994 sample results.

3.2 GROUND WATER

K-40 was the only radionuclide reported in the eight ground water samples collected during 1995. The K-40 results were relatively consistent with results from previous years. There are no control ground water sample locations.

3. 3 DRINKING WATER

Tritium was detected in two of eight samples collected during 1995. This detection frequency was less than the frequency in 1984 when tritium was detected in eleven of the twelve samples (92% frequency). Also, K-40 which occurs naturally, was detected in drinking water samples.

During 1984 (preoperation) and 1985, tritium was detected in drinking water samples with 71% frequency, at average detectable concentrations ranging from approximately 300 to 400 pCi/liter. During the period from 1986 through 1989, tritium was detected in drinking water samples with 41% frequency, at average detectable concentrations ranging from approximately 500 to 800 pCi/liter. This concurrent decrease in detection frequency and increase in average detectable concentration is probably attributable to the change in tritium analysis laboratories occurring during 1986 from a contractor laboratory to Duke Power's Radioanalysis Laboratory.

The tritium detection frequencies and low average concentrations which have been reported in previous years for all drinking water locations are consistent with ambient background levels and were probably not affected by CNS effluents.

3.4 SURFACE WATER

K-40, Be-7 and tritium, all of which occur naturally, were detected in surface water samples collected during 1995. Tritium was detected in all of the four composite samples collected from discharge canal Location 208.

Table 3.4-A lists the annual average Location 208 surface water sample tritium concentrations, 1984 through 1995. The table also lists the total tritium activity released into the CNS discharge canal via liquid effluents during each year. Ratios of the tritium sample concentration divided by the tritium effluent activity are also included.

Tritium concentrations in surface water collected from Location 208 exceed ambient background levels. CNS liquid effluents appear to be affecting discharge canal surface water tritium concentrations. The concentration/activity ratios are relatively consistent, considering the uncertainties inherent in such an evaluation.

TABLE 3.4-A

SURFACE WATER SAMPLE TRITIUM RESULTS - LOCATION 208

Year	Surface Water Average H-3 Conc. (pCi/liter)	Total H-3 Activity Released in Liquid Effluents (Curies)	Concentration/ Activity Ratio
1984	313	0	N/A
1985	1190	175	6.8
1986	2340	236	9.9
1987	4170	728	5.7
1988	6030	706	8.5
1989	5270	890	5.9
1990	3980	594	6.7
1991	4868	646	7.5
1992	6583	774	8.5
1993	5980	826	7.2
1994	2106	585	3.6
1995	5130	490	10.5
1985 - 1995 Average	**4350**	**605**	**7.2**

3.5 MILK

During 1995, 78 milk samples were analyzed, 52 at the two indicator Locations and 26 at the control Locations.

Cs-137 was detected in one milk sample collected during 1995 in which the concentration was 8.6 pCi/liter. This concentration is comparable to results obtained since 1987.

During 1984, Cs-137 was detected with 15.0% frequency (12/80), at concentrations ranging from 5.00 to 10.0 pCi/liter.

The single detection of Cs-137 in 1995 indicator location milk sample occurred during second quarter. Cs-137 was not detected in any airborne effluents from CNS during 1994 or 1995. Cs-137 attributable to past nuclear weapons testing is known to exist in many environmental media at low, highly variable levels.

Based upon the overall consistency between indicator location, control location, and preoperational milk sample results, low-level Cs-137 activity in the single milk sample collected during 1995 cannot reasonably be attributed to CNS effluents.

3.6 BROADLEAF VEGETATION

In 1995, 36 broadleaf vegetation samples were analyzed, 27 at three indicator Locations and nine at the control Location. Low levels of Cs-137 were detected in broadleaf vegetation samples collected throughout 1995 in four of the 27 indicator Location samples analyzed.

The average detectable Cs-137 concentration was 36 pCi/wet-kilogram.

During 1984, Cs-137 was detected with 25.0% frequency (9/36), at concentrations ranging from 20.1 to 130 pCi/kg-wet.

Cs-137 was not detected in CNS airborne effluents during 1994 or 1995. Also, Cs-137 attributable to past nuclear weapons testing is known to exist in many environmental media at low, highly variable levels.

Based upon consistency between indicator location, control location, and preoperational broadleaf vegetation sample results, low-level Cs-137 activity in broadleaf vegetation samples collected during 1995 is not likely attributable to CNS effluents.

3.7 SHORELINE SEDIMENT

During 1995, a total of 20 shoreline sediment samples were analyzed, four from indicator Location 210 and 12 from indicator Location 208. Four control samples were analyzed from control Location 215.

In 1984, Fe-59 was reported in one of the six shoreline sediment samples at a concentration of 67.3 pCi/kg-dry. Cs-134 was reported in four of these samples at concentrations ranging from 24.4 to 39.2 pCi/kg-dry. Cs-137 was reported in two of these samples at concentrations of 41.7 and 173 pCi/kg-dry.

With exception of Cs-137, it was unlikely that these radionuclides were present in these preoperational samples; their detection was probably attributable to the ND6620 sensitivity phenomenon discussed previously. No other Technical Specification radionuclides were detected in 1984 shoreline sediment samples.

During 1995, Mn-54, Co-58, Co-60 and Cs-137 were detected in the majority of the twelve shoreline sediment samples collected from CNS discharge canal Locations 208-1S, 208-2S and 208-3S. These radionuclides have been predominant in shoreline sediment samples each year since 1986. The same radionuclides have been predominant in fish and bottom sediment samples collected from the discharge canal. Other radionuclides reported (besides K-40 and Be-7) were Co-57, Nb-95, Sn-113 and Sb-125. All detected radionuclides other than K-40 and Be-7 were attributable to liquid effluents.

Table 3.7-A summarizes shoreline sediment sample results for discharge canal Location 208 during the five year period from 1990 to 1995.

From 1990 through 1995, average detectable radionuclide concentrations have generally shown an increasing trend. For 1995, most concentrations were lower than previous year's. Parameter D which is the ratio of concentration to annual activity released displays a general increasing trend for Co-58, Co-60 and Cs-137. Correlations observed between Parameter D and Parameter F (ratio of sample concentration to cumulative decay corrected activity released) exhibit a generally increasing trend. Therefore, these observations seem to show that environmental removal processes have not overcome the accumulation of annual activity released via liquid effluents in shoreline sediment samples.

From the observations, annual activity released in liquid effluents may contribute to previously deposited activity in Location 208 shoreline sediment samples. Also, no samples analyzed from indicator Location 210 or control Location 215 resulted in detectable radionuclides other than those naturally occurring.

TABLE 3.7-A
SHORELINE SEDIMENT SAMPLE RESULTS - LOCATION 208-1S, 2S, AND 3S

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Mn-54	[A]	58.8	137	155	160	65.8	122
	[B]	11/12	4/12	9/12	10/12	9/12	10/12
	[C]	34.4	30.2	23.2	13.5	10.3	16.8
	[D]	1.7	4.5	6.7	11.9	6.4	7.3
	[E]	54.6	54.5	47.5	34.6	25.7	28.2
	[F]	1.1	2.5	3.3	4.6	2.6	4.3

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Co-58	[A]	227	404	1227	1070	798	1326
	[B]	11/12	6/12	11/12	12/12	12/12	12/12
	[C]	244	196	364	398	272	308
	[D]	0.9	2.1	3.4	2.7	2.9	4.3
	[E]	248	203	370	408	283	316
	[F]	0.9	2.0	3.32	2.6	2.8	4.2

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Co-60	[A]	193	488	633	1040	573	944
	[B]	11/12	5/12	11/12	12/12	12/12	11/12
	[C]	127	156	116	67.0	68.1	105
	[D]	1.5	3.1	5.5	16	8.4	9.0
	[E]	412	517	569	566	564	600
	[F]	0.5	0.9	1.1	1.8	1.0	1.6

[A] Average Detectable Concentration (pCi/kg-dry)
[B] Fraction of Total Measurements Yielding Detectable Activity
[C] Annual Activity Released in Liquid Effluents (mCi)
[D] Concentration/Annual Activity Ratio (pCi/kg-dry per mCi)
[E] Decayed Cumulative Activity Released in Liquid Effluents (mCi)
[F] Concentration/Cumulative Activity Ratio (pCi/kg-dry per mCi)

TABLE 3.7-A
(Continued)

SHORELINE SEDIMENT SAMPLE RESULTS - LOCATION 208-1S, 2S, AND 3S

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Cs-134	[A]	33.2	16.3	50.8	84.0	34	0
	[B]	6/12	2/12	4/12	4/12	2/12	0/12
	[C]	10.2	5.6	4.3	3.20	1.17	0.54
	[D]	3.3	2.9	11.8	26.3	29.1	0.0
	[E]	27.3	25	23.8	20.2	15.6	11.7
	[F]	1.2	.65	2.1	4.2	2.2	0.0

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Cs-137	[A]	81.8	64.9	107	126	107	85
	[B]	12/12	6/12	12/12	12/12	12/12	12/12
	[C]	17.1	9.5	8.9	7.84	3.88	2.68
	[D]	4.6	6.9	12.0	16.1	27.6	31.7
	[E]	98.2	105	104	109	110	110
	[F]	0.8	0.6	1.0	1.2	1.0	0.8

[A] Average Detectable Concentration (pCi/kg-dry)
[B] Fraction of Total Measurements Yielding Detectable Activity
[C] Annual Activity Released in Liquid Effluents (mCi)
[D] Concentration/Annual Activity Ratio (pCi/kg-dry per mCi)
[E] Decayed Cumulative Activity Released in Liquid Effluents (mCi)
[F] Concentration/Cumulative Activity Ratio (pCi/kg-dry per mCi)

3.8 FISH

A total of 24 fish samples were collected during 1995 with 12 collected from indicator Location 208 and 12 from control Location 216.

During 1984, Zn-65 was reported in one of the twelve fish samples, at a concentration of 148 pCi/kg-wet. Nb-95 was reported in one of these samples at a concentration of 189 pCi/kg-wet. Cs-137 was reported in two of these samples at concentrations of 25.7 and 64.6 pCi/kg-wet. With exception of Cs-137, it was unlikely that these radionuclides were present in these preoperational samples; their detection was probably attributable to the ND6620 sensitivity phenomenon discussed previously. No other Technical Specification radionuclides were detected in 1984 fish samples.

During 1995, Mn-54, Co-58, Co-60, and Cs-137 were frequently detected in the twelve fish samples collected from CNS discharge canal Location 208. The four radionuclides have been predominant each year since 1986 and have also been predominant in shoreline and bottom sediment samples collected from the discharge canal. Detected radionuclides other than K-40 and Be-7 were attributable to liquid effluents from CNS. Cs-134 was not identified in fish samples in 1995.

Sample results for fish collected at indicator Location 208 were reviewed by type of fish. Results showed that all radionuclide detection frequencies and concentrations were higher for forager fish than for predatory and bottom feeding fish. These results have been observed from 1990 through 1995.

Table 3.8-A summarizes fish sample results for discharge canal Location 208 during the six year period 1990 through 1995.

From 1990 through 1995, average detectable concentrations correlated acceptably with annual activities released in liquid effluents [Parameter D] which is an important aspect of this report and of the data contained in Table 3.8-A. In addition, ratios for Co-58 and Cs-137 were higher in 1995 than previous years, and ratios for detectable concentrations and cumulative activity released [Parameter F] were higher. There were no detectable occurrences of Cs-134 in twelve samples analyzed. Observation suggests that annual average detectable radionuclide concentrations from Location 208 fish samples were primarily dependent on the annual and the cumulative activities released via liquid effluents.

TABLE 3.8-A
FISH SAMPLE RESULTS - LOCATION 20[illegible]

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Mn-54	[A]	100	94.4	121.	60.1	22.9	56.5
	[B]	3/12	4/12	1/9	5/14	1/12	3/12
	[C]	34.4	30.2	23.2	13.5	10.3	16.8
	[D]	2.9	3.1	5.2	4.4	2.2	3.4
	[E]	54.6	54.5	47.4	34.6	25.7	28.2
	[F]	1.8	1.7	2.5	1.7	0.9	2.0

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Co-58	[A]	301	292	270.7	557	114	890
	[B]	7/12	6/12	3/9	9/14	5/12	5/12
	[C]	244	196	364	398	272	308
	[D]	1.2	1.5	0.7	1.4	0.4	2.9
	[E]	248	203	436	410	283	316
	[F]	1.2	1.4	0.6	1.4	0.4	2.8

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Co-60	[A]	311	387	557	212	43.5	265
	[B]	3/12	4/12	1/9	8/14	5/12	3/12
	[C]	127	156	116	67.0	68.1	105
	[D]	2.4	2.5	4.8	3.2	0.6	2.5
	[E]	412	517	569	566	564	600
	[F]	0.8	0.7	0.9	0.4	0.1	0.4

[A] Average Detectable Concentration (pCi/kg-wet)
[B] Fraction of Total Measurements Yielding Detectable Activity
[C] Annual Activity Released in Liquid Effluents (mCi)
[D] Concentration/Annual Activity Ratio (pCi/kg-wet per mCi)
[E] Decayed Cumulative Activity Released in Liquid Effluents (mCi)
[F] Concentration/Cumulative Activity Ratio (pCi/kg-wet per mCi)

TABLE 3.8-A
(CONTINUED)

FISH SAMPLE RESULTS - LOCATION 208

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Cs-134	[A]	31.7	25.7	38	38.2	0	0
	[B]	5/12	6/12	3/9	1/14	0/12	0/12
	[C]	10.2	5.6	4.3	3.20	1.17	0.54
	[D]	3.1	4.6	8.8	11.9	0.0	0.0
	[E]	27.3	25.1	22.3	19.1	14.8	11.1
	[F]	1.2	1.0	1.7	2.0	0.0	0.0

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Cs-137	[A]	55.9	45.9	51.8	29.8	26.2	67.7
	[B]	10/12	12/12	8/9	12/14	8/12	7/12
	[C]	17.7	9.5	8.9	7.84	3.88	2.68
	[D]	3.2	4.9	5.8	3.8	6.8	25.3
	[E]	98.2	105	111	116	117	117
	[F]	0.6	0.4	0.5	0.3	0.2	0.6

[A] Average Detectable Concentration (pCi/kg-wet)
[B] Fraction of Total Measurements Yielding Detectable Activity
[C] Annual Activity Released in Liquid Effluents (mCi)
[D] Concentration/Annual Activity Ratio (pCi/kg-wet per mCi)
[E] Decayed Cumulative Activity Released in Liquid Effluents (mCi)
[F] Concentration/Cumulative Activity Ratio (pCi/kg-wet per mCi)

3.9 DIRECT GAMMA RADIATION (TLD)

Forty thermoluminescent dosimeters (TLD's) are located in the vicinity of CNS in order to monitor direct gamma radiation. The TLD locations are divided into four subgroups: three control locations, sixteen site boundary ring locations, sixteen 4-5 mile ring locations and five special interest locations. This data is shown in Table 3.9-A along with the respective values for previous years. The highest annual mean doserate for an indicator location was 28 mrad per quarter. That TLD was located at indicator location 206 (0.7 miles WNW from the site). The annual mean for the control locations was 20 mrad per quarter.

The t-statistic or t-test was used to compare 1995 TLD results to TLD measurements taken during preoperation. The ratio of site boundary and 4-5 mile ring results for 1995 was compared to the ratio of results for preoperation.

The value of the t-statistic calculated by comparing preoperational results to 1995 TLD results was -0.292. As shown in Table 3.9-B, this is within the boundary values of ± 2.042, based on 32 measurements and a 95% confidence interval.

In addition, the calculated total body dose (from gaseous effluents) for 1995 was 0.0664 mrem (0.06% of the measured TLD values) and it can be concluded that discharges from Catawba had very little impact upon the measured TLD values.

TABLE 3.9-A

DIRECT GAMMA RADIATION (TLD) RESULTS

Year	All Locations (40 Locations)	Site Boundary Ring (16 Locations)	4-5 Mile Ring (16 Locations)	Special Interest (5 Locations)	Control Locations (3 Locations)
	Avg. Dose (mrad)	**Avg. Dose** (mrad)	**Avg. Dose** (mrad)	**Avg. Dose** (mrad)	**Avg. Dose** (mrad)
1984	82.9	87.5	82.6	71.2	79.3
1985	110.7	116.9	108.7	98.6	108.9
1986	98.9	104.3	98.5	85.7	94.4
1987	90.0	97.0	87.4	78.6	84.7
1988	70.9	74.6	70.3	63.1	67.1
1989	62.6	67.1	60.8	54.3	60.0
1990	46.4	52.0	44.5	39.1	39.1
1991	56.7	62.0	54.1	48.0	46.7
1992	74.3	80.4	72.5	66.2	64.5
1993	63.6	70.3	60.8	56.2	53.6
1994	69.0	76.3	69.3	66.5	63.9
1995	92.8	99.6	89.7	86.6	80.8

TABLE 3.9-B

Comparison of Inner Ring/Outer Ring TLD Results		
	1995 (mrad/yr)	Preop. (mrad/yr)
Inner Ring	100.25	87.48
Outer Ring	91.82	82.60
Ratio	1.12	1.10
Variance	0.05	0.07
t-value	-0.292	
t-table (95%)	±2.042	

3.10 FOOD PRODUCTS

Collection of food product samples from an irrigated garden at a residence located on Lake Wylie downstream from CNS (Location 253) began in July, 1989. During 1995, nine samples were collected from this location.

During 1995, K-40 was detected in all nine samples. These results were consistent with all sample results since 1989.

3.11 BOTTOM SEDIMENT

During 1984, REMP bottom sediment samples were not a required collection media. Samples were first collected during 1986 from three points in the discharge canal, following review of shoreline sediment and fish samples collected there. Bottom sediment control samples have never been collected.

During 1995, Mn-54, Co-58, Co-60 and Cs-137 were detected in most of the twelve bottom sediment samples collected from CNS discharge canal Locations 208-1M, 208-2M, and 208-3M. The four radionuclides have been predominant each year since 1986 along with Cs-134. These radionuclides have been predominant in shoreline sediment samples collected from the discharge canal, samples for which average detectable concentrations are considerably lower. In addition, Co-57 and Sb-125 were identified in samples. All detected radionuclides were attributable to liquid effluents from CNS during 1995. Location 208-2M displayed the highest overall concentrations for the major radionuclides. Co-60 concentration was significantly higher with an average detectable concentration of 9446 pCi/kg-dry.

Table 3.11-A summarizes the bottom sediment sample results for discharge Location 208 during the period 1990 through 1995. Detection frequencies remained high and relatively stable throughout the period. Shoreline sediment frequencies paralleled this trend.

From 1990 through 1995, average detectable concentrations for bottom sediment correlated extremely well with cumulative, corrected activities released in liquid effluents since preoperation [Parameter E] as indicated by the consistent ratios of these values [Parameter F]. The one exception is Co-60 which has exhibited an increasing trend. Over the period of trending, indications show no significant environmental "removal" processes have decreased Co-60 accumulation to levels below that expected based on cumulative, decay corrected activities released in liquid effluents since preoperation.

In all cases, the liquid effluent concentrations in 1995 followed the same changes as the average detectable concentrations. Therefore, the impact of plant operation on bottom sediment from Location 208 was at an expected level when considering the liquid effluent data for 1995.

The annual average detectable radionuclide concentrations for Location 208 bottom sediment samples tend to be largely dependent on the cumulative concentration and to a moderate degree for Co-60 and Cs-137 on annual activities released via liquid effluents. It appears that discharge canal activities deposited annually in bottom sediment are not removed by environmental processes at the same rate shown by activity measured in shoreline sediment and fish.

TABLE 3.11-A
BOTTOM SEDIMENT SAMPLE RESULTS - LOCATION 208-1M, 2M, AND 3M

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Mn-54	[A]	381	453	525	372	277	338
	[B]	12/12	11/12	12/12	12/12	12/12	11/12
	[C]	34.4	30.2	23.2	13.5	10.3	16.8
	[D]	11.1	15.0	22.6	27.6	26.9	20.1
	[E]	54.6	54.5	47.4	34.6	25.7	28.2
	[F]	7.0	8.3	11.1	10.8	10.8	12.0

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Co-58	[A]	783	691	1603	1597	1498	2067
	[B]	8/12	10/12	7/12	10/12	10/12	9/12
	[C]	244	196	364	398	272	308
	[D]	3.2	3.5	4.4	4.0	5.5	6.7
	[E]	248	203	423	410	284	316
	[F]	3.2	3.4	3.8	3.9	5.3	6.5

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Co-60	[A]	4120	5100	7095	5792	5322	9446
	[B]	12/12	12/12	12/12	12/12	12/12	12/12
	[C]	108	156	116	67.0	68.1	105
	[D]	29.4	32.7	61.2	86.4	78.1	90.0
	[E]	318	517	569	566	564	600
	[F]	10.0	9.9	12.5	10.2	9.4	15.8

[A] Average Detectable Concentration (pCi/kg-dry)
[B] Fraction of Total Measurements Yielding Detectable Activity
[C] Annual Activity Released in Liquid Effluents (mCi)
[D] Concentration/Annual Activity Ratio (pCi/kg-dry per mCi)
[E] Decayed Cumulative Activity Released in Liquid Effluents (mCi)
[F] Concentration/Cumulative Activity Ratio (pCi/kg-dry per mCi)

TABLE 3.11-A
(Continued)

BOTTOM SEDIMENT SAMPLE RESULTS - LOCATION 208-1M, 2M, AND 3M

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Cs-134	[A]	127	122	78	184	0	72
	[B]	9/12	8/12	7/12	5/12	0/12	1/12
	[C]	10.2	5.6	4.3	3.20	1.2	0.54
	[D]	12.5	21.7	18.1	57.5	0.0	133
	[E]	27.3	25.1	22.3	19.1	14.8	11.1
	[F]	4.7	4.9	3.5	9.6	0.0	6.5

Radio-nuclide(s)	Parameter	1990	1991	1992	1993	1994	1995
Cs-137	[A]	506	548	494	538	427	491
	[B]	12/12	12/12	11/12	12/12	12/12	12/12
	[C]	17.7	9.5	8.9	7.84	3.9	2.7
	[D]	28.6	57.9	55.6	68.6	110	183
	[E]	98.2	105	111	116	117	117
	[F]	5.2	5.2	4.5	4.6	3.6	4.2

[A] Average Detectable Concentration (pCi/kg-dry)
[B] Fraction of Total Measurements Yielding Detectable Activity
[C] Annual Activity Released in Liquid Effluents (mCi)
[D] Concentration/Annual Activity Ratio (pCi/kg-dry per mCi)
[E] Decayed Cumulative Activity Released in Liquid Effluents (mCi)
[F] Concentration/Cumulative Activity Ratio (pCi/kg-dry per mCi)

3.12 LAND USE CENSUS

The 1995 Annual Land Use Census was conducted as required by Selected Licensee Commitment 16.11-14. Table 3.12 summarizes the census results. Figure 3.12 contains the map showing identified locations. Sectors shown in Table 3.12 which have no values listed had no corresponding location identified in that sector.

Based upon 1995 Annual Land Use Census results for the nearest residences and gardens, dose evaluations were performed to ensure that the current air and broadleaf vegetation sampling locations complied with the requirements of Selected Licensee Commitment and that no changes or additions to these locations were required. The evaluations showed that all existing air and broadleaf vegetation sampling locations complied with the requirements. No changes or additions to these locations were required or made as a result of the 1995 Census.

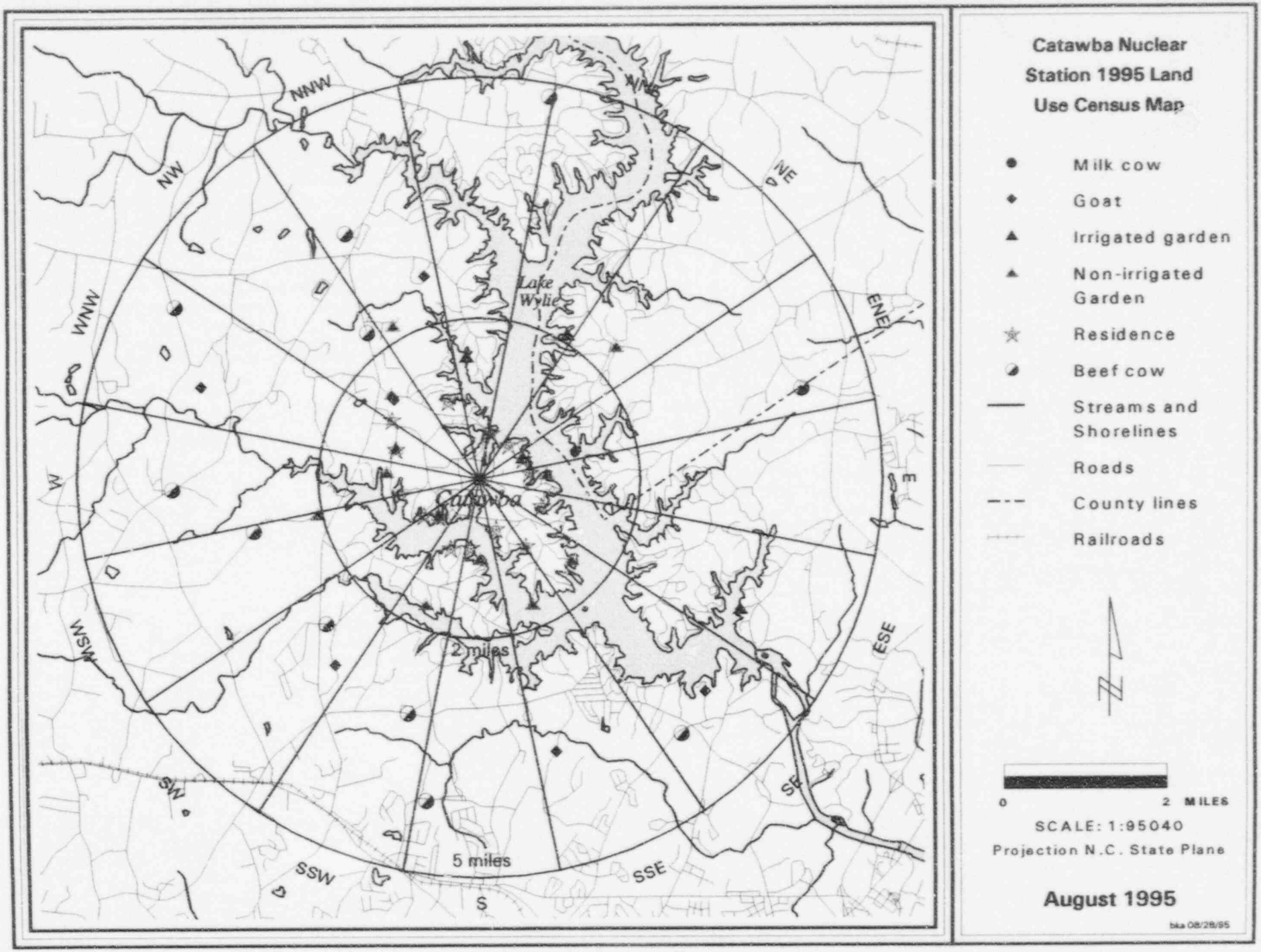
The 1995 Annual Land Use Census included a search for all locations within a distance of five miles (eight kilometers) from CNS where any cattle or goats were kept (not just the nearest location in each sector). Numerous locations were identified within the five mile radius. Each location was investigated to determine whether the animals were being used for meat production, milk production, reproduction or a combination of these purposes. Investigation of all locations revealed that none of the animals were "milking animals" (milk was not being consumed by humans). The three current CNS REMP milk sampling locations (dairies located at distances greater than five miles from CNS), have been sampled routinely since preoperation. No changes or additions to CNS REMP milk sampling locations were made as a result of the Census.

TABLE 3.12-A
1995 CATAWBA NUCLEAR STATION
ANNUAL LAND USE CENSUS RESULTS

Date(s) Performed
07/20/95 - 08/16/95

Sector		Distance (Miles)	Sector		Distance (Miles)
N	Nearest Residence	0.64	S	Nearest Residence	0.83
	Nearest Garden	1.54		Nearest Garden	0.98
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	4.87		Nearest Beef Cow	4.05
	Nearest Goat	-		Nearest Goat	-
NNE	Nearest Residence	0.63	SSW	Nearest Residence	0.89
	Nearest Garden	2.07		Nearest Garden	1.69
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	-		Nearest Beef Cow	3.04
	Nearest Goat	-		Nearest Goat	-
NE	Nearest Residence	0.60	SW	Nearest Residence	0.65
	Nearest Garden	2.39		Nearest Garden	0.66
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	-		Nearest Beef Cow	2.59
	Nearest Goat	-		Nearest Goat	2.95
ENE	Nearest Residence	0.62	WSW	Nearest Residence	0.79
	Nearest Garden	0.60		Nearest Garden	2.04
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	4.17		Nearest Beef Cow	2.87
	Nearest Goat	1.27		Nearest Goat	-
E	Nearest Residence	0.65	W	Nearest Residence	0.96
	Nearest Garden	0.84		Nearest Garden	1.15
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	-		Nearest Beef Cow	3.81
	Nearest Goat	-		Nearest Goat	-
ESE	Nearest Residence	0.84	WNW	Nearest Residence	1.10
	Nearest Garden	3.63		Nearest Garden	1.11
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	-		Nearest Beef Cow	4.34
	Nearest Goat	-		Nearest Goat	3.63
SE	Nearest Residence	0.99	NW	Nearest Residence	1.31
	Nearest Garden	1.52		Nearest Garden	1.52
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	4.05		Nearest Beef Cow	2.30
	Nearest Goat	3.87		Nearest Goat	1.44
SSE	Nearest Residence	0.62	NNW	Nearest Residence	1.06
	Nearest Garden	1.70		Nearest Garden	2.19
	Nearest Milk Cow	-		Nearest Milk Cow	-
	Nearest Beef Cow	-		Nearest Beef Cow	3.49
	Nearest Goat	3.54		Nearest Goat	2.62

Figure 3.12


Catawba Nuclear
Station 1995 Land
Use Census Map
Milk cow
Goat
Irrigated garden
Non-irrigated
Garden
Residence
Beef cow
Streams and
Shorelines
Roads
County lines
Railroads
N
NNW
NW
WNW
W
WSW
SW
SSW
S
SSE
SE
ESE
ENE
NE
NNE
Lake
Wylie
Catawba
2 miles
5 miles
0
2 MILES
SCALE: 1:95040
Projection N.C. State Plane
August 1995
bka 08/28/95

4.0 EVALUATION OF DOSE FROM ENVIRONMENTAL MEASUREMENTS VERSUS ESTIMATED DOSE FROM RELEASES

4.1 DOSE FROM ENVIRONMENTAL MEASUREMENTS

Annual doses to maximum exposed individuals were estimated based on measured concentrations of radionuclides in 1995 CNS REMP samples. The primary purpose of estimating doses based on sample results was to allow comparison to effluent program dose estimates. Doses based on sample results were conservatively calculated in a manner as equivalent as possible to effluent-based dose estimates.

Doses based on sample results were calculated using the methodology and data presented in NRC Regulatory Guide 1.109. Measured radionuclide concentrations, averaged over the entire year for a specific radionuclide, indicator location, and sample type, were used to calculate REMP-based doses, after subtracting applicable average background concentration (as measured at the corresponding control location). Regulatory Guide 1.109 consumption rates for the maximum exposed individual were used in the calculations. When the guide listed "NO DATA" as the dose factor for a given radionuclide and organ, a dose factor of zero was assumed.

Three radionuclides detected in 1995 REMP samples, Co-57, Sn-133 and Sb-125 had no dose factors listed in Regulatory Guide 1.109. Dose factors for these radionuclides were taken from Appendix C of NUREG/CR-1276.

Maximum dose estimates (Highest Annual Mean Concentration) based on drinking water, milk, broadleaf vegetation, fish and shoreline sediment sample results are reported in Table 4.1-A.

REMP-based dose estimates were not reported for airborne radioiodine, airborne particulate, or ground water sample types because no radionuclides other than naturally-occurring K-40 and Be-7 were detected in these samples. Dose estimates were not reported for surface water or bottom sediment sample types because sampled surface water is not considered to be a potable drinking water source and because sampled bottom

sediment is permanently submerged. Dose estimates based upon REMP TLD results are discussed in Section 3.9.

The maximum dose to each organ from any single sample type (the "limiting" sample type) other than direct radiation from gaseous effluents, was determined and reported in Table 4.1-A. For bone, liver, kidney, total body and lung, the limiting sample type was milk collected at Location 209. The maximum organ dose estimate for any single sample type (other than direct radiation from gaseous effluents) collected during 1995 was 1.73 mrem to the maximum exposed infant's liver from consuming milk collected at Location 209.

In order to generate REMP-based dose estimates which could be compared to reported effluent-based dose estimates, two additional evaluations were performed:

- Maximum 1995 REMP-based dose estimates for drinking water, shoreline sediment and fish sample results were summed to determine the maximum total doses for all sampled liquid effluent release pathways. The dose contribution from shoreline sediment to each organ other than the skin was assumed to equal the total body contribution from shoreline sediment. The maximum total organ dose estimates for the critical age groups have been reported in Table 4.1-A. The maximum total organ dose estimate for all liquid effluent release pathways sampled during 1995 was 0.558 mrem to the maximum exposed adult's GI-LLI. The critical pathway was forager fish which accounted for 95% of the total GI-LLI dose of 0.568 mrem.

- Maximum 1995 REMP-based dose estimates for airborne radioiodine, airborne particulate and broadleaf vegetation sample results were summed to determine the maximum total REMP-based doses for all sampled gaseous effluent release pathways. The resulting maximum total organ dose estimates for the critical age groups have been reported in Table 4.1-A.

The maximum total organ dose estimate for all gaseous effluent release pathways sampled during 1995 was 1.73 mrem to the maximum exposed infant's liver. The critical pathway was milk which accounted for 100% of the total liver dose.

4.2 ESTIMATED DOSE FROM RELEASES

Throughout the year, dose estimates were calculated based on actual 1995 liquid and gaseous effluent release data. Effluent-based dose estimates were calculated using the LADTAP and GASPAR computer programs which employ methodology and data presented in NRC Regulatory Guide 1.109. The 1995 CNS Annual Radioactive Effluent Release Report included calendar year dose estimates for the maximum exposed individual from liquid and gaseous effluent releases. These reported doses are shown in Table 4.1-A along with the corresponding REMP-based dose estimates.

Effluent-based liquid release doses are summations of dose contributions from drinking water, fish and shoreline sediment (estimated for the discharge canal) pathways.

The effluent-based gaseous release doses of Table 4.1-A report noble gas exposure and iodine, particulate and tritium exposure. For noble gas exposure there is no critical age group, as the maximum exposed individuals are assumed to receive the same doses, regardless of their age group. For iodine, particulate and tritium exposure, maximum total organ dose was 0.502 mrem for skin and critical age was child. The critical pathway for the exposure was broadleaf vegetation.

4.3 COMPARISON OF DOSES

Tables 4.1-A shows comparisons of REMP-based versus effluent-based maximum dose estimates, critical ages, and critical pathways for liquid and gaseous release pathways. As discussed in Part 4.1, REMP-based estimates have been calculated to be as analogous as possible to corresponding effluent-based estimates. The estimates can then be compared directly.

One difference between environmental and effluent-based dose estimates is all effluent-based dose estimates include pathway contributions from tritium contained in liquid and gaseous effluents. Drinking water pathways include dose contributions from tritium. Air, milk and broadleaf vegetation pathways do not include tritium's contribution. Similar differences exist for other radionuclides detected in effluent samples. However, as a result of dilution, transport, and radioactive decay, the concentrations are too low to be detected in REMP samples (and their associated dose contributions are therefore not accounted for in REMP-based dose estimates). These differences result in REMP-based dose estimates that are biased low in comparison to effluent-based estimates.

Significant levels of tritium and Cs-137 are present throughout the environment and are not attributable to CNS effluents. REMP samples often contain these radionuclides, sometimes at detectable levels much greater than levels anticipated to result from station effluents. In addition, high variability in the frequency and level that tritium and Cs-137 are detected in REMP indicator and control location samples, introduces large uncertainties when estimating REMP-based dose contributions from net detectable concentrations of these radionuclides. All 1995 REMP-based dose estimates, other than those for samples collected at the discharge canal, are entirely attributable to detection of tritium or Cs-137 in the corresponding REMP samples. It is probable that the doses typically overestimate the true contributions from tritium and Cs-137 released in CNS effluents.

Finally, airborne noble gas samples are not collected as part of the REMP, preventing an analogous comparison of effluent-based noble gas exposure estimates.

The REMP-based dose estimates were less than the corresponding effluent-based estimates for the liquid and gaseous release pathways, with the exception of the total body

estimates for the liquid pathway. The REMP-based dose estimate was 0.189 mrem for total body. The analogous effluent dose estimate was 0.164 mrem.. This indicates that effluent program dose estimates are both valid, and in the majority of cases, reasonably conservative. Doses to members of the public attributable to the operation of CNS are being maintained well within regulatory guidelines.

TABLE 4.1-A

1995 ENVIRONMENTAL AND EFFLUENT DOSE COMPARISON FOR LIQUID AND GASEOUS WASTE RELEASE PATHWAYS

LIQUID RELEASE PATHWAY

Organ	Environmental or Effluent Data	Critical Age	Critical Pathway	Maximum Dose* (mrem)
Skin	Environmental	Teen	Shoreline Sediment	1.74E-02
Skin	Effluent	Teen	Shoreline Sediment	5.84E-02
Bone	Environmental	Child	Fish	1.53E-01
Bone	Effluent	Teen	Fish	1.73E-01
Liver	Environmental	Adult	Fish	2.12E-01
Liver	Effluent	Teen	Fish	2.60E-01
T. Body	Environmental	Adult	Fish	1.89E-01
T. Body	Effluent	Adult	Fish	1.64E-01
Thyroid	Environmental	Child	Drinking Water	2.75E-02
Thyroid	Effluent	Teen	Shoreline Sediment	1.02E-01
Kidney	Environmental	Teen	Fish	7.51E-02
Kidney	Effluent	Teen	Fish	1.29E-01
Lung	Environmental	Teen	Fish	3.99E-02
Lung	Effluent	Teen	Shoreline Sediment	8.92E-02
GI-LLI	Environmental	Adult	Fish	5.58E-01
GI-LLI	Effluent	Adult	Fish	1.73E+00

* Maximum dose is a summation of the fish, drinking water and shoreline sediment pathways.

TABLE 4.1-A

1995 ENVIRONMENTAL AND EFFLUENT DOSE COMPARISON FOR LIQUID AND GASEOUS WASTE RELEASE PATHWAYS

GASEOUS RELEASE PATHWAY

Organ	Environmental or Effluent Data	Critical Age	Critical Pathway	Maximum Dose (mrem)
		NOBLE GAS EXPOSURE		
Skin	Environmental	-	-	Not Sampled
Skin	Effluent	N/A	Noble Gas	1.58E-01
T. Body	Environmental	-	-	Not Sampled
T. Body	Effluent	N/A	Noble Gas	6.64E-02

Organ	Environmental or Effluent Data	Critical Age	Critical Pathway	Maximum Dose* (mrem)
		IODINE, PARTICULATE, and TRITIUM		
Bone	Environmental	Infant	Milk	1.48E+00
Liver	Environmental	Infant	Milk	1.73E+00
T. Body	Environmental	Adult	Milk	3.55E-01
Thyroid	Environmental	-	-	0.00E+00
Kidney	Environmental	Infant	Milk	4.65E-01
Lung	Environmental	Infant	Milk	1.88E-01
GI-LLI	Environmental	Teen	Milk	1.05E-02
Skin	Environmental	Teen	Shoreline Sediment	1.74E-02
Skin	Effluent	Child	Vegetation	5.02E-01

* Maximum dose is a summation of the inhalation, milk and vegetation pathways.

TABLE 4.1-B

Maximum Individual Dose for 1995 based on Environmental Measurements (mrem) for Catawba Nuclear Station

Age	Sample Medium	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Infant	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	0.00E+00
	Milk	1.48E+00	1.73E+00	1.23E-01	0.00E+00	4.65E-01	1.88E-01	5.42E-03	0.00E+00
	TOTAL	1.48E+00	1.75E+00	1.44E-01	2.10E-02	4.86E-01	2.09E-01	2.64E-02	0.00E+00
Child	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02	0.00E+00
	Milk	9.28E-01	8.88E-01	1.31E-01	0.00E+00	2.89E-01	1.04E-01	5.56E-03	0.00E+00
	Broadleaf Vegetation	3.06E-01	2.93E-01	4.32E-02	0.00E+00	9.55E-02	3.44E-02	1.83E-03	0.00E+00
	Fish	1.53E-01	1.77E-01	9.12E-02	6.10E-03	5.49E-02	2.32E-02	1.30E-01	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	3.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-03
	TOTAL	1.39E+00	1.38E+00	2.90E-01	2.75E-02	4.61E-01	1.83E-01	1.59E-01	3.63E-03
Teen	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	0.00E+00
	Milk	3.85E-01	5.13E-01	1.79E-01	0.00E+00	1.74E-01	6.78E-02	7.29E-03	0.00E+00
	Broadleaf Vegetation	1.69E-01	2.25E-01	7.85E-02	0.00E+00	7.67E-02	2.98E-02	3.21E-03	0.00E+00
	Fish	1.21E-01	2.00E-01	1.23E-01	7.39E-03	6.39E-02	2.87E-02	3.71E-01	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	1.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-02
	TOTAL	6.75E-01	9.49E-01	4.07E-01	1.86E-02	3.26E-01	1.38E-01	3.93E-01	1.74E-02
Adult	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	1.59E-02	1.59E-02	1.59E-02	1.59E-02	1.59E-02	1.59E-02	0.00E+00
	Milk	2.12E-01	2.91E-01	1.90E-01	0.00E+00	9.86E-02	3.28E-02	5.63E-03	0.00E+00
	Broadleaf Vegetation	1.84E-01	2.51E-01	1.65E-01	0.00E+00	8.52E-02	2.83E-02	4.86E-03	0.00E+00
	Fish	1.13E-01	1.96E-01	1.70E-01	9.61E-03	6.38E-02	2.71E-02	5.42E-01	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	2.65E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E-03
	TOTAL	5.09E-01	7.54E-01	5.44E-01	2.55E-02	2.64E-01	1.04E-01	5.68E-01	3.11E-03

NOTE: Dose tables are provided for sample media displaying positive nuclide occurrence.

Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Infant

Infant Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 330 l

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Water (pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.99E-05	4.51E-06	NO DATA	4.41E-06	NO DATA	7.31E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	3.60E-06	8.98E-06	NO DATA	NO DATA	NO DATA	8.97E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	3.08E-05	5.38E-05	2.12E-05	NO DATA	NO DATA	1.59E-05	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	1.08E-05	2.55E-05	NO DATA	NO DATA	NO DATA	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.8[illegible]E-05	6.31E-05	[illegible]91E-05	NO DATA	3.06E-05	NO DATA	5.33E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	4.20E-[illegible]	1.73E-0[illegible]	[illegible]8	NO DATA	1.24E-08	NO DATA	1.46E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	2.06E-07	5.02E-08	3.56E-08	NO DATA	5.41E-08	NO DATA	2.50E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	NO DATA	1.51E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	3.77E-04	7.03E-04	7.10E-05	NO DATA	1.81E-04	7.42E-05	1.91E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	5.[illegible]E-04	[illegible]11E-04	4.33E-05	NO DATA	1.64E-04	6.64E-05	1.91E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba-La-140	1.71E-04	1.71E-07	8.81E-06	NO DATA	4.06E-08	1.05E-07	4.20E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	214	207.00	0.00E+00	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02
							Dose Commitment (mrem) =			0.00E+00	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02

Dose from Milk Pathway for 1995 Data
Maximum Exposed Infant

Infant Dose from Milk Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = **330 l**

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Milk (pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.99E-05	4.51E-06	NO DATA	4.41E-06	NO DATA	7.31E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	3.60E-06	8.98E-06	NO DATA	NO DATA	NO DATA	8.97E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	3.08E-05	5.38E-05	2.12E-05	NO DATA	NO DATA	1.59E-05	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	1.08E-05	2.55E-05	NO DATA	NO DATA	NO DATA	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.84E-05	6.31E-05	2.91E-05	NO DATA	3.06E-05	NO DATA	5.33E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	4.20E-08	1.73E-08	1.00E-08	NO DATA	1.21E-08	NO DATA	1.46E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	2.06E-07	5.02E-08	3.56E-08	NO DATA	5.41E-08	NO DATA	2.50E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	NO DATA	1.51E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	3.77E-04	7.03E-04	7.10E-05	NO DATA	1.81E-04	7.42E-05	1.91E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	5.22E-04	6.11E-04	4.33E-05	NO DATA	1.64E-04	6.64E-05	1.91E-06	209	8.60	1.48E+00	1.73E+00	1.23E-01	0.00E+00	4.65E-01	1.88E-01	5.42E-03
BaLa-140	1.71E-04	1.71E-07	8.81E-06	NO DATA	4.06E-08	1.05E-07	4.20E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
						Dose Commitment (mrem) =				1.48E+00	1.73E+00	1.23E-01	0.00E+00	4.65E-01	1.88E-01	5.42E-03

Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Child

Child Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 510 l

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Water (pCi/l)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	1.50E-06	5.51E-06	NO DATA	NO DATA	NO DATA	1.05E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	1.65E-05	2.67E-05	1.33E-05	NO DATA	NO DATA	7.74E-06	2.78E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.30E-05	NO DATA	6.41E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	1.16E-07	2.55E-08	2.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.54E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.62E-04	3.67E-05	1.96E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba-La-140	8.31E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	214	207.00	0.00E+00	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02
						Dose Commitment (mrem) =				0.00E+00	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02

Dose from Milk Pathway for 1995 Data
Maximum Exposed Child

Child Dose from Milk Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = **330** l

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Milk (pCi/l)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	1.80E-06	5.51E-06	NO DATA	NO DATA	NO DATA	1.05E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	1.65E-05	2.67E-05	1.33E-05	NO DATA	NO DATA	7.74E-06	2.78E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.38E-05	NO DATA	6.41E-06	ALL	0.69	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	1.16E-07	2.55E-08	2.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.54E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.02E-04	3.67E-05	1.96E-06	209.00	8.60	9.28E-01	8.88E-01	1.31E-01	0.00E+00	2.89E-01	1.04E-01	5.56E-03
Ba-La-140	8.31E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
						Dose Commitment (mrem) =				9.28E-01	8.88E-01	1.31E-01	0.00E+00	2.89E-01	1.04E-01	5.56E-03

Dose from Broadleaf Vegetation Pathway for 1995 Data
Maximum Exposed Child

Child Dose from Vegetation Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

Usage (intake in one year) = 26 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Food (pCi/kg)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	1.80E-06	5.51E-06	NO DATA	NO DATA	NO DATA	1.05E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	1.65E-05	2.67E-05	1.33E-05	NO DATA	NO DATA	7.74E-06	2.78E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.30E-05	NO DATA	6.41E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	1.16E-07	2.55E-08	2.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.54E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.02E-04	3.67E-05	1.96E-06	201	36.00	3.06E-01	2.93E-01	4.32E-02	0.00E+00	9.55E-02	3.44E-02	1.83E-03
Ba-La-140	8.31E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
						Dose Commitment (mrem) =				3.06E-01	2.93E-01	4.32E-02	0.00E+00	9.55E-02	3.44E-02	1.83E-03

Dose from Fish Pathway for 1995 Data
Maximum Exposed Child

Child Dose from Fish Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

H-3 Concentration in Fish = Surface Water pCi/l x Bioaccumulation Factor 0.9 pCi/l = 4841 pCi/l x 0.9 = 4357 pCi/kg

Usage (intake in one year) = 6.9 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Fish (pCi/kg)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06	208	56.50	0.00E+00	4.17E-03	1.11E-03	0.00E+00	1.17E-03	0.00E+00	3.50E-03
Co-58	NO DATA	1.80E-06	5.51E-06	NO DATA	NO DATA	NO DATA	1.65E-05	208	890.10	0.00E+00	1.11E-02	3.38E-02	0.00E+00	0.00E+00	0.00E+00	6.45E-02
Fe-59	1.65E-05	2.67E-05	1.33E-05	NO DATA	NO DATA	7.74E-06	2.78E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05	208	265.50	0.00E+00	9.69E-03	2.86E-02	0.00E+00	0.00E+00	0.00E+00	5.37E-02
Zn-65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.30E-05	NO DATA	6.41E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05	208	13.80	2.14E-06	8.34E-07	5.96E-07	0.00E+00	7.84E-07	0.00E+00	1.54E-03
Zr-95	1.16E-07	2.55E-08	2.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.54E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.02E-04	3.67E-05	1.96E-06	208	67.70	1.53E-01	1.46E-01	2.16E-02	0.00E+00	4.76E-02	1.71E-02	9.16E-04
BaLa-140	8.31E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	208	4357.00	0.00E+00	6.10E-03	6.10E-03	6.10E-03	6.10E-03	6.10E-03	6.10E-03
						Dose Commitment (mrem) =				1.53E-01	1.77E-01	9.12E-02	6.10E-03	5.49E-02	2.32E-02	1.30E-01

Dose from Shoreline Sediment Pathway for 1995 Data
Maximum Exposed Child

Shoreline Recreation=	14	hr (in one year)
Shore Width Factor =	0.2	
Sediment Surface Mass =	40	kg/m2

Child Dose from Shorline Sediment Pathway (mrem) = Shorline Recreation (hr) x External Dose Factor (mrem/hr per pCi/m2) x Shore Width Factor x Sediment Surface Mass (kg/m2) x Sediment Concentration (pCi/kg)

	External Dose Factor Standing on Contaminated Ground		Highest Annual Net Mean Concentration		Dose	
	(mrem/hr per pCi/m2)		Indicator	Sediment	(mrem)	
Radionuclide	T. Body	Skin	Location	(pCi/kg)	T. Body	Skin
Mn-54	5.80E-09	6.80E-09	208-2S	122.27	7.94E-05	9.31E-05
Co-58	7.00E-09	8.20E-09	208-2S	1326.43	1.04E-03	1.22E-03
Fe-59	8.00E-09	9.40E-09	ALL	0.00	0.00E+00	0.00E+00
Co-60	1.70E-08	2.00E-08	208-2S	944.33	1.80E-03	2.12E-03
Zn-65	4.00E-09	4.60E-09	ALL	0.00	0.00E+00	0.00E+00
Nb-95	5.10E-09	6.00E-09	208-2S	113.00	6.45E-05	7.59E-05
Zr-95	5.00E-09	5.80E-09	ALL	0.00	0.00E+00	0.00E+00
I-131	2.80E-09	3.40E-09	ALL	0.00	0.00E+00	0.00E+00
Cs-134	1.20E-08	1.40E-08	ALL	0.00	0.00E+00	0.00E+00
Cs-137	4.20E-09	4.90E-09	208-1S	85.00	4.00E-05	4.66E-05
BaLa-140	2.10E-09	2.40E-09	ALL	0.00	0.00E+00	0.00E+00
*Sb-125	3.10E-09	3.50E-09	208-3S	148.45	5.15E-05	5.82E-05
*Co-57	9.10E-10	1.00E-09	208-2S	36.90	3.76E-06	4.13E-06
*Sn-113	1.90E-09	2.20E-09	208-2S	71.10	1.51E-05	1.75E-05
			Dose Commitment (mrem) =		3.09E-03	3.63E-03

* Dose Factors from Reference 6.11

Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Teen

Teen Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 510 l

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Drinking Water (pCi/l.)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	5.90E-06	1.17E-06	NO DATA	1.76E-06	NO DATA	1.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.81E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.28E-05	NO DATA	8.47E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	8.22E-09	4.56E-09	2.51E-09	NO DATA	4.42E-09	NO DATA	1.95E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	4.12E-08	1.30E-08	8.94E-09	NO DATA	1.91E-08	NO DATA	3.00E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	NO DATA	1.62E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	8.37E-05	1.97E-04	9.14E-05	NO DATA	6.26E-05	2.39E-05	2.45E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	1.12E-04	1.49E-04	5.19E-05	NO DATA	5.07E-05	1.97E-05	2.12E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba-La-140	2.84E-05	3.48E-08	1.83E-06	NO DATA	1.18E-08	2.34E-08	4.38E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	214	207.00	0.00E+00	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02
						Dose Commitment (mrem) =				0.00E+00	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02

Dose from Milk Pathway for 1995 Data
Maximum Exposed Teen

Teen Dose from Milk Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

Usage (intake in one year) = 400 l

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Milk (pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	5.90E-06	1.17E-06	NO DATA	1.76E-06	NO DATA	1.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.81E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.28E-05	NO DATA	8.47E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	8.22E-09	4.56E-09	2.51E-09	NO DATA	4.42E-09	NO DATA	1.95E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	4.12E-08	1.30E-08	8.94E-09	NO DATA	1.91E-08	NO DATA	3.00E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	NO DATA	1.62E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	8.37E-05	1.97E-04	9.14E-05	NO DATA	6.26E-05	2.39E-05	2.45E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	1.12E-04	1.49E-04	5.19E-05	NO DATA	5.07E-05	1.97E-05	2.12E-06	209	8.60	3.85E-01	5.13E-01	1.79E-01	0.00E+00	1.74E-01	6.78E-02	7.29E-03
BaLa-140	2.84E-05	3.48E-08	1.83E-06	NO DATA	1.18E-08	2.34E-08	4.38E-05	ALL	0.0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
								Dose Commitment (mrem) =		3.85E-01	5.13E-01	1.79E-01	0.00E+00	1.74E-01	6.78E-02	7.29E-03

Dose from Broadleaf Vegetation Pathway for 1995 Data
Maximum Exposed Teen

Teen Dose from Vegetation Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

Usage (intake in one year) = 42 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Food (kg/yr)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	5.90E-06	1.17E-0	NO DATA	1.76E-06	NO DATA	1.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.81E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.28E-05	NO DATA	8.47E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	8.22E-09	4.56E-09	2.51E-09	NO DATA	4.42E-09	NO DATA	1.95E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	4.12E-08	1.30E-08	8.94E-09	NO DATA	1.91E-08	NO DATA	3.00E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	NO DATA	1.62E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	8.37E-05	1.97E-04	9.14E-05	NO DATA	6.26E-05	2.39E-05	2.45E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	1.12E-04	1.49E-04	5.19E-05	NO DATA	5.07E-05	1.97E-05	2.12E-06	201	36.00	1.69E-01	2.25E-01	7.85E-02	0.00E+00	7.67E-02	2.98E-02	3.21E-03
BaLa-140	2.84E-05	3.48E-08	1.83E-06	NO DATA	1.18E-08	2.34E-08	4.38E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
						Dose Commitment (mrem) =				1.69E-01	2.25E-01	7.85E-02	0.00E+00	7.67E-02	2.98E-02	3.21E-03

Dose from Fish Pathway for 1995 Data
Maximum Exposed Teen

Teen Dose from Fish Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

H-3 Concentration in Fish = Surface Water pCi/l x Bioaccumulation Factor 0.9 pCi/l = 4841 pCi/l x 0.9 = 4357 pCi/kg

Usage (intake in one year) = 16 kg

	Ingestion Dose Factor)							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Fish (pCi/kg)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	5.90E-06	1.17E-06	NO DATA	1.76E-06	NO DATA	1.21E-05	208	56.50	0.00E+00	5.33E-03	1.06E-03	0.00E+00	1.59E-03	0.00E+00	1.09E-02
Co-58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05	208	890.10	0.00E+00	1.38E-02	3.19E-02	0.00E+00	0.00E+00	0.00E+00	1.91E-01
Fe-59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.81E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05	208	265.50	0.00E+00	1.19E-02	2.69E-02	0.00E+00	0.00E+00	0.00E+00	1.55E-01
Zn-65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.28E-05	NO DATA	8.47E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	8.22E-09	4.56E-09	2.51E-09	NO DATA	4.42E-09	NO DATA	1.95E-05	208	13.80	1.81E-06	1.01E-06	5.54E-07	0.00E+00	9.76E-07	0.00E+00	4.31E-03
Zr-95	4.12E-08	1.30E-08	8.94E-09	NO DATA	1.91E-08	NO DATA	3.00E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	NO DATA	1.62E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	8.37E-05	1.97E-04	9.14E-05	NO DATA	6.26E-05	2.39E-05	2.45E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	1.12E-04	1.49E-04	5.19E-05	NO DATA	5.07E-05	1.97E-05	2.12E-06	208	67.70	1.21E-01	1.61E-01	5.62E-02	0.00E+00	5.49E-02	2.13E-02	2.30E-03
Ba-La-140	2.84E-05	3.48E-08	1.83E-06	NO DATA	1.18E-08	2.34E-08	4.38E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	208	4357.00	0.00E+00	7.39E-03	7.39E-03	7.39E-03	7.39E-03	7.39E-03	7.39E-03
						Dose Commitment (mrem) =				1.21E-01	2.00E-01	1.23E-01	7.39E-03	6.39E-02	2.87E-02	3.71E-01

Dose from Shoreline Sediment Pathway for 1995 Data
Maximum Exposed Teen

Shoreline Recreation = 67 hr (in one year)
Shore Width Factor = 0.2
Sediment Surface Mass = 40 kg/m2

Teen Dose from Shorline Sediment Pathway (mrem) = Shorline Recreation (hr) x External Dose Factor (mrem/hr per pCi/m2) x Shore Width Factor x Sediment Surface Mass (kg/m2) x Sediment Concentration (pCi/kg)

External Dose Factor Standing on Contaminated Ground			Highest Annual Net Mean Concentration		Dose	
	(mrem/hr per pCi/m2)				(mrem)	
Radionuclide	T. Body	Skin	Indicator Location	Sediment (pCi/kg)	T. Body	Skin
Mn-54	5.80E-09	6.80E-09	208-2S	122.27	3.80E-04	4.46E-04
Co-58	7.00E-09	8.20E-09	208-2S	1326.43	4.98E-03	5.83E-03
Fe-59	8.00E-09	9.40E-09	ALL	0.00	0.00E+00	0.00E+00
Co-60	1.70E-08	2.00E-08	208-2S	944.33	8.60E-03	1.01E-02
Zn-65	4.00E-09	4.60E-09	ALL	0.00	0.00E+00	0.00E+00
Nb-95	5.10E-09	6.00E-09	208-2S	113.00	3.09E-04	3.63E-04
Zr-95	5.00E-09	5.80E-09	ALL	0.00	0.00E+00	0.00E+00
I-131	2.80E-09	3.40E-09	ALL	0.00	0.00E+00	0.00E+00
Cs-134	1.20E-08	1.40E-08	ALL	0.00	0.00E+00	0.00E+00
Cs-137	4.20E-09	4.90E-09	208-1S	85.00	1.91E-04	2.23E-04
BaLa-140	2.10E-09	2.40E-09	ALL	0.00	0.00E+00	0.00E+00
*Sb-125	3.10E-09	3.50E-09	208-3S	148.45	2.47E-04	2.78E-04
*Co-57	9.1E-10	1E-09	208-2S	36.90	1.80E-05	1.98E-05
*Sn-113	1.9E-09	2.2E-09	208-2S	71.10	7.24E-05	8.38E-05
	Dose Commitment (mrem) =				1.48E-02	1.74E-02

* Dose Factors from Reference 6.11

Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Adult

Adult Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 730 l

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Water (pCi/l)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BaLa-140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-08	4.18E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	214	207.00	0.00E+00	1.59E-02	1.59E-02	1.59E-02	1.59E-02	1.59E-02	1.59E-02
						Dose Commitment (mrem) =				0.00E+00	1.59E-02	1.59E-02	1.59E-02	1.59E-02	1.59E-02	1.59E-02

Dose from Milk Pathway for 1995 Data
Maximum Exposed Adult

Adult Dose from Milk Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 310 l

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Milk (pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06	209	8.60	2.12E-01	2.91E-01	1.90E-01	0.00E+00	9.86E-02	3.28E-02	5.63E-03
Ba-La-140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-08	9.25E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
								Dose Commitment (mrem) =		2.12E-01	2.91E-01	1.90E-01	0.00E+00	9.86E-02	3.28E-02	5.63E-03

Dose from Broadleaf Vegetation Pathway for 1995 Data
Maximum Exposed Adult

Adult Dose from Vegetation (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 64 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Food (pCi/kg)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	7.97E-05	1.99E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06	201	36.00	1.84E-01	2.51E-01	1.65E-01	0.00E+00	8.52E-02	2.83E-02	4.86E-03
Ba-La-140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-09	4.18E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
								Dose Commitment (mrem) =		1.84E-01	2.51E-01	1.65E-01	0.00E+00	8.52E-02	2.83E-02	4.86E-03

Dose from Fish Pathway for 1995 Data
Maximum Exposed Adult

Adult Dose from Fish Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

H-3 Concentration in Fish = Surface Water pCi/l x Bioaccumulation Factor 0.9 pCi/l = 4841 pCi/l x 0.9 = 4357 pCi/kg

Usage (intake in one year) = 21 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Fish (pCi/kg)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05	208	56.50	0.00E+00	5.42E-03	1.03E-03	0.00E+00	1.61E-03	0.00E+00	1.66E-02
Co-58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05	208	890.10	0.00E+00	1.39E-02	3.12E-02	0.00E+00	0.00E+00	0.00E+00	2.82E-01
Fe-59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05	208	265.50	0.00E+00	1.19E-02	2.63E-02	0.00E+00	0.00E+00	0.00E+00	2.24E-01
Zn-65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05	208	13.80	1.80E-06	1.00E-06	5.39E-07	0.00E+00	9.91E-07	0.00E+00	6.09E-03
Zr-95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06	208	67.70	1.13E-01	1.55E-01	1.02E-01	0.00E+00	5.26E-02	1.75E-02	3.00E-03
BaLa-140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-08	4.18E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	208	4357.00	0.00E+00	9.61E-03	9.61E-03	9.61E-03	9.61E-03	9.61E-03	9.61E-03
							Dose Commitment (mrem) =			1.13E-01	1.96E-01	1.70E-01	9.61E-03	6.38E-02	2.71E-02	5.42E-01

Dose from Shoreline Sediment Pathway for 1995 Data
Maximum Exposed Adult

Shoreline Recreation = 12 hr (in one year)
Shore Width Factor = 0.2
Sediment Surface Mass = 40 kg/m2

Adult Dose from Shorline Sediment Pathway (mrem) = Shorline Recreation (hr) x External Dose Factor (mrem/hr per pCi/m2) x Shore Width Factor x Sediment Surface Mass (kg/m2) x Sediment Concentration (pCi/kg)

	External Dose Factor Standing on Contaminated Ground (mrem/hr per pCi/m2)		Highest Annual Net Mean Concentration		Dose (mrem)	
Radionuclide	T. Body	Skin	Indicator Location	Sediment (pCi/kg)	T. Body	Skin
Mn-54	5.80E-09	6.80E-09	208-2S	122.27	6.81E-05	7.98E-05
Co-58	7.00E-09	8.20E-09	208-2S	1326.43	8.91E-04	1.04E-03
Fe-59	8.00E-09	9.40E-09	ALL	0.00	0.00E+00	0.00E+00
Co-60	1.70E-08	2.00E-08	208-2S	944.33	1.54E-03	1.81E-03
Zn-65	4.00E-09	4.60E-09	ALL	0.00	0.00E+00	0.00E+00
Nb-95	5.10E-09	6.00E-09	208-2S	113.00	5.53E-05	6.51E-05
Zr-95	5.00E-09	5.80E-09	ALL	0.00	0.00E+00	0.00E+00
I-131	2.80E-09	3.40E-09	ALL	0.00	0.00E+00	0.00E+00
Cs-134	1.20E-08	1.40E-08	ALL	0.00	0.00E+00	0.00E+00
Cs-137	4.20E-09	4.90E-09	208-1S	85.00	3.43E-05	4.00E-05
BaLa-140	2.10E-09	2.40E-09	ALL	0.00	0.00E+00	0.00E+00
*Sb-125	3.10E-09	3.50E-09	208-3S	148.45	4.42E-05	4.99E-05
*Co-57	9.10E-10	1.00E-09	208-2S	36.90	3.22E-06	3.54E-06
*Sn-113	1.90E-09	2.20E-09	208-2S	71.10	1.30E-05	1.50E-05
			Dose Commitment (mrem) =		2.65E-03	3.11E-03

* Dose Factors from Reference 6.11

5.0 QUALITY ASSURANCE

5.1 DUKE POWER COMPANY ENVIRONMENTAL LABORATORIES

5.1.1 SAMPLE COLLECTION

Radiological and Environmental Services, Fisheries, and Aquatic Ecology performed the environmental sample collections as specified by approved sample collection procedures.

5.1.2 SAMPLE ANALYSIS

The Radiological and Environmental Services Group performed the environmental sample analyses as specified by approved analysis procedures.

5.1.3 DOSIMETRY ANALYSIS

The Radiation and Dosimetry Records group performed environmental dosimetry measurements as specified by approved dosimetry analysis procedures.

5.1.4 INTRALABORATORY QUALITY ASSURANCE

Radiological and Environmental Services has an internal quality assurance program which monitors each type of instrumentation for reliability and accuracy. Daily quality control checks ensure that instruments are in proper working order and these checks are used to monitor instrument performance.

Additionally, National Institute of Standards and Technology (NIST) standards that represent counting geometries are analyzed as unknowns at various frequencies ranging from weekly to annually to verify that efficiency calibrations are valid. The frequency is dependent upon instrument use and performance. Investigations are performed and documented should calibration verification data fall out of limits.

5.1.5 INTERLABORATORY QUALITY ASSURANCE

5.1.5.1 DUKE POWER'S AUDIT DIVISION

The Catawba Nuclear Station Radiation Protection Section participated in a Quality Assurance audit during the period of February 27 through March 16, 1995. This audit was conducted by the Nuclear Assessment and Issues Division, Regulatory Audit Group. No recommendations pertaining to the Catawba Radiological Environmental Monitoring Program were identified in the audit.

5.1.5.2 DUKE POWER'S NUCLEAR PRODUCTION INTERCOMPARISON PROGRAM

The Radiological and Environmental Services group participated in the Duke Power Nuclear Generation Department Intercomparison Program during 1995. Interlaboratory cross-check standards, including marinelli beakers, air filters, air cartridges, gross alpha/beta on smears, and tritium in water samples were analyzed at various times of the year by the four counting laboratories in Duke Power Company for this program. A summary of these Intercomparison Reports for 1995 is documented in Table 5.0-A.

5.1.5.3 U.S. NUCLEAR REGULATORY COMMISSION INSPECTIONS

The Radiological Environmental Monitoring Program was not audited by the NRC in 1995.

5.1.5.4 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY INTERCOMPARISON PROGRAM

The Radiological and Environmental Services Group participated in the Environmental Protection Agency (EPA) Environmental Monitoring Systems Laboratory Intercomparison Program. The EPA sample types included mixed gamma in water, mixed gamma in milk, gamma in air filters, iodine in milk, tritium in water, iodine in water, gross beta in air filters and gross beta in water.

Radiological and Environmental Services prepared and analyzed each sample as quickly as possible. Data obtained greater than EPA limits is documented by follow-up investigations. The Radiological and

Environmental Services EPA Intercomparison Report code is "CP". A summary of the EPA Intercomparison Reports for 1995 is documented in Table 5.0-B.

An investigation was made into failed Beta in Water and Gamma in Water dated 4/18/95. Both tests conducted by Radiological and Environmental Services failed high due to cross-contamination of the samples. The investigation reviewed preparation of samples, training of personnel, materials used for sample preparation, laboratory area used for preparation, and review of data.

One sample was analyzed but results were not reported by the required date. (See corrective action #1 below)

After careful review of preparation of samples, it was determined that all procedure steps were accurately followed. No deviation in preparation procedures were found. Laboratory personnel that performed the analysis were sufficiently trained and had conducted similar analyses with acceptable results. The contamination of the cross-check samples is believed to have resulted from analysis of primary reactor coolant samples by Radiological and Environmental Services. The potential existed for glassware and work surfaces to be contaminated with primary coolant in the preparation area. This is considered to be the root cause of the contamination.

Corrective actions are as follows:

1) The receipt and tracking of EPA samples was refined in order to meet all future deadlines.

2) An entire process improvement initiative was implemented that distinctly isolates all lab work by potential activity.

3) Specific glassware has been physically identified for all analyses types, e.g. environmental, effluent, primary reactor coolant, EPA, etc..

4) Cleaning procedures have been reviewed and improved for glassware and counter surfaces, minimizing the potential for contamination.

5) Data reviewers have been reminded to use historical information as "benchmark" data to find potential anomalies.

6) Procedures will be modified for 1996 samples to include a blank to be prepared with each set of samples. This will verify the presence of any interfering contaminants in sample matrices.

5.1.5.5 NRC/STATE OF S.C. INTERCOMPARISON PROGRAM

Radiological and Environmental Services routinely participates with the Bureau of Radiological Health of the State's Department of Health and Environmental Control (DHEC) in an intercomparison program. Radiological and Environmental Services sends air, water, milk, vegetation, sediment, and fish samples which have been collected to the State of South Carolina DHEC Laboratory for intercomparison analysis.

5.1.5.6 STATE OF N.C. TLD INTERCOMPARISON PROGRAM

Radiation Dosimetry and Records routinely participates in a TLD intercomparison program. Every six to eight months, the State of North Carolina Radiation Protection Section irradiates environmental dosimeters and sends them to the Radiation Dosimetry and Records group for analysis of the unknown estimated delivered exposure. A summary of the State of North Carolina Environmental Dosimetry Intercomparison Report for 1995 is documented in Table 5.0-C.

5.2 CONTRACTOR LABORATORIES

No contractor laboratories were used during 1995.

TABLE 5.0-A

DUKE POWER COMPANY
INTERLABORATORY COMPARISON PROGRAM

1995 CROSS-CHECK RESULTS FOR THE RADIOLOGICAL & ENVIRONMENTAL SERVICES LABORATORY

Gamma:

Collection Date	Geometry	Nuclide	Acceptance Range (pCi/l)	Reference Value (pCi/l)	Reported Value (pCi/l)
6/23/95	3.5 Liter	Cr-51	1.93E4 - 3.42E4	2.57E4	2.60E4
		Mn-54	1.30E4 - 2.30E4	1.73E4	1.77E4
		Co-58	5.82E3 - 1.03E4	7.76E3	8.01E3
		Fe-59	5.46E3 - 9.68E3	7.28E3	7.51E3
		Co-60	1.31E4 - 2.33E4	1.75E4	1.78E4
		Zn-65	1.31E4 - 2.33E4	1.75E4	1.84E4
		Cs-134	7.95E3 - 1.41E4	1.06E4	9.8E3
		Cs-137	7.36E3 - 1.31E4	9.81E3	9.97E3
		Ce-141	5.62E3 - 9.96E3	7.49E3	7.70E3
Collection Date	Geometry	Nuclide	Acceptance Range (pCi/total)	Reference Value (pCi/total)	Reported Value (pCi/total)
6/23/95	1.0 Liter	Cr-51	4.45E4 - 7.89E4	5.93E4	6.02E4
		Mn-54	3.02E4 - 5.35E4	4.02E4	4.16E4
		Co-58	1.36E4 - 2.41E4	1.81E4	1.88E4
		Fe-59	1.27E4 - 2.25E4	1.69E4	1.84E4
		Co-60	3.04E4 - 5.39E4	4.05E4	4.20E4
		Zn-65	3.03E4 - 5.37E4	4.04E4	4.34E4
		Cs-134	1.83E4 - 3.25E4	2.44E4	2.26E4
		Cs-137	1.70E4 - 3.02E4	2.27E4	2.28E4
		Ce-141	1.31E4 - 2.31E4	1.74E4	1.85E4

Gamma:

Collection Date	Geometry	Nuclide	Acceptance Range (pCi/total)	Reference Value (pCi/total)	Reported Value (pCi/total)
8/18/95	Cartridge	I-131	4.43E-1 - 7.86E-1	5.91E-1	6.07E-1

Tritium:

Collection Date	Geometry	Nuclide	Acceptance Range (µCi/ml)	Reference Value (µCi/ml)	Reported Value (µCi/ml)
8/18/95	20ml vial	H-3	1.22E-3 - 3.39E-3	2.04E-3	1.74E-3

TABLE 5.0-B

U.S. ENVIRONMENTAL PROTECTION AGENCY
INTERLABORATORY COMPARISON PROGRAM

1995 CROSS-CHECK RESULTS FOR
THE RADIOLOGICAL & ENVIRONMENTAL SERVICES LABORATORY

Gamma in Water:

Collection Date	Nuclide(s)	Control Limits (3 Sigma; N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
2/3/95	I-131	82.7 - 117.3	100	98.7
4/18/95	Co-60	20.3 - 37.7	29	30.7
	Cs-134	11.3 - 28.7	20	213.7 [(1)]
	Cs-137	2.3 - 19.7	11	276.3 [(1)]
6/9/95	Ba-133	65.1 - 92.9	79	81.0
	Co-60	31.3 - 48.7	40	41.7
	Zn-65	62.1 - 89.9	76	81.0
	Cs-134	41.3 - 58.9	50	46.7
	Cs-137	26.3 - 43.7	35	34.7
10/6/95	I-131	122.0 - 174.0	148	158.7
10/17/95	Co-60	40.3 - 57.7	49	50.0
	Cs-134	31.3 - 48.7	40	37.7
	Cs-137	21.3 - 38.7	30	30.0
11/3/95	Ba-133	81.7 - 116.3	99	100
	Co-60	51.3 - 68.7	60	55.7
	Zn-65	102.5 - 147.5	125	132.7
	Cs-134	31.3 - 48.7	40	35.3
	Cs-137	40.3 - 57.7	49	51.3

Gamma in Milk:

Collection Date	Nuclide(s)	Control Limits (3 Sigma; N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
9/29/95	I-131	81.7 - 116.3	99	106.3
	Cs-137	41.3 - 58.7	50	49.3

Beta in Water:

Collection Date	Nuclide(s)	Control Limits (3 Sigma; N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
1/27/95	Gross Beta	0.0 - 13.7	5.0	8.3 (2)
4/18/95	Gross Beta	69.3 - 103.9	86.6	405.0 (1)
7/21/95	Gross Beta	10.7 - 28.1	19.4	27.3
10/27/95	Gross Beta	16.1 - 33.5	24.8	29.0

Tritium in Water:

Collection Date	Nuclide(s)	Control Limits (3 Sigma; N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
3/10/95	H-3	6144.2 - 8725.8	7435	7132.3
8/4/95	H-3	4028.5 - 5715.5	4872	4626.7

Air Filter:

Collection Date	Nuclide(s)	Control Limits (3 Sigma; N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
8/25/95	Cs-137	16.3 - 33.7	25.0	26.7
	Gross Beta	69.3 - 103.9	86.6	86.7

(1) See Explanation in Section 5.1.5.4.
(2) This value was not reported before the due date and was not included in the reports.

TABLE 5.0-C

STATE OF NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL HEALTH AND NATURAL RESOURCES

1995 ENVIRONMENTAL DOSIMETER CROSS-CHECK RESULTS

Cross-Check Date	State of N.C. Delivered Value (mR)	Radiation Dosimetry & Records Reported Value (mR)	Acceptance Criteria +/- 10 %
May-95	100	92.5	Pass
Nov-95	60	56.9	Pass

6.0 REFERENCES

6.1 Catawba Selected License Commitments

6.2 Catawba Technical Specifications

6.3 Catawba Final Safety Analysis Review

6.4 Catawba Offsite Dose Calculation Manual

6.5 Catawba Annual Environmental Operating Report 1985 - 1994

6.6 Catawba Annual Effluent Report 1985 - 1994

6.7 Probability and Statistics in Engineering and Management Science, Hines and Montgomery, 1969, pages 287-293.

6.8 Practical Statistics for the Physical Sciences, Havilcek and Crain, 1988, pages 83-93.

6.9 Nuclear Regulatory Commission Regulatory Guide 1.109, Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purposes of Evaluating Compliance with 10CFR50, Appendix I.

6.10 Radiological and Environmental Services Operating Procedures

6.11 NUREG/CR-1276, Users Manual for LADTAP II - A Computer Program for Calculating Radiation Exposure to Man from Routine Release of Nuclear Reactor Liquid Effluents.

APPENDIX A

ENVIRONMENTAL SAMPLING AND ANALYSIS PROCEDURES

APPENDIX A

ENVIRONMENTAL SAMPLING AND ANALYSIS PROCEDURES

Adherence to established procedures for sampling and analysis of all environmental media at Catawba Nuclear Station was required to ensure compliance with Station Selected Licensee Commitments. Analytical procedures were employed to ensure that Selected Licensee Commitments detection capabilities were achieved.

Environmental sampling and analyses were performed by Radiological and Environmental Services, Dosimetry and Records, Fisheries and Aquatic Ecology.

This appendix describes the environmental sampling frequencies and analysis procedures by media type.

I. CHANGE OF SAMPLING PROCEDURES

No sampling changes were made to the sampling procedure during 1995.

II. DESCRIPTION OF ANALYSIS PROCEDURES

Gamma spectroscopy analyses are performed using high purity germanium gamma detectors and Canberra analytical software. Designated sample volumes are transferred to appropriate counting geometries and analyzed by gamma spectroscopy. Perishable samples such as fish and broadleaf vegetation are ground to achieve a homogeneous mixture. Soils and sediments are dried, sifted to remove foreign objects (rocks, clams, glass, etc.) then transferred to appropriate counting geometry.

Low-level iodine analyses are performed by passing a designated sample aliquot through an ion exchange resin to remove and concentrate any iodine in the aqueous sample (milk or water). The resin is then dried and transferred to appropriate counting geometry and analyzed by gamma spectroscopy.

Tritium analyses are performed quarterly by using low-level environmental liquid scintillation analysis technique on a Packard 2550 liquid scintillation system.

Gross beta analysis is performed by concentrating a designated aliquot of sample precipitate and analyzing by gas-flow proportional counters.

III. CHANGE OF ANALYSIS PROCEDURES

Low Level Iodine 131 (LLI-131) analysis was discontinued for all surface water sites on January 28, 1995. This analysis was not required for surface water samples by Selected License Commitments.

IV. SAMPLING AND ANALYSIS PROCEDURES

A.1 AIRBORNE PARTICULATE AND RADIOIODINE

Airborne particulate and radioiodine samples at each of five locations were composited by means of continuous air samplers. Air particulates were collected on a particulate filter and radioiodines were collected in a charcoal cartridge situated behind the filter in the sampler. The samplers are designed to operate at a constant flow rate (in order to compensate for any filter loading) and are set to sample approximately 2 cubic feet per minute. Filters and cartridges were collected weekly. A weekly gamma analysis and gross beta analysis were performed on each filter and a weekly gamma analysis was performed on each charcoal cartridge. The filter and charcoal cartridge were analyzed independently. The continuous composite samples were collected from the locations listed below.

Location 200	=	Site Boundary (0.6 mi. NNE)
Location 201	=	Site Boundary (0.5 mi. NE)
Location 205	=	Site Boundary (0.3 mi. SW)
Location 212	=	Tega Cay, SC (3.3 mi. E)
Location 217	=	Rock Hill Substation (10.3 mi. SSE)

A.2 DRINKING WATER

Biweekly composite drinking water samples were collected at each of two locations. A low-level Iodine-131 analysis was performed on each biweekly composite sample. A gross beta and gamma analysis was performed on monthly composites. Tritium analysis was performed on the quarterly composites. The composites were collected biweekly from the locations listed below.

Location 214	=	Rock Hill Water Supply (7.3 mi. SE)
Location 218	=	Belmont Water Supply (13.4 mi. NNE)

A.3 SURFACE WATER

Biweekly composite samples were collected at each of three locations. A low-level Iodine-131 analysis was performed on each biweekly composite sample until January 28, 1995. A gamma analysis was performed on the monthly composites. Tritium

analysis was performed on the quarterly composites. The composites were collected biweekly from the locations listed below.

Location 208	=	Discharge Canal (0.5 mi. S)
Location 211	=	Wylie Dam (4.0 mi. ESE)
Location 215	=	River Pointe - Hwy 49 (4.2 mi. NNE)

A.4 MILK

Biweekly grab samples were collected at each of three locations. A gamma and low-level Iodine-131 analysis was performed on each sample. The biweekly grab samples were collected from the locations listed below.

Location 209	=	Wood Dairy - (6.0 mi. SSW)
Location 219	=	Pursley Dairy - (5.7 mi. SW)
Location 221	=	Oates Dairy - (14.5 mi. NW)

A.5 BROADLEAF VEGETATION

Monthly samples were collected as available at each of four locations. A gamma analysis was performed on each sample. The samples were collected from the locations listed below.

Location 200	=	Site Boundary (0.6 mi. NNE)
Location 201	=	Site Boundary (0.5 mi. NE)
Location 217	=	Rock Hill Substation (10.3 mi. SSE)
Location 226	=	Site Boundary (0.5 mi. S)

A.6 SHORELINE SEDIMENT

Semiannual samples were collected at each of three locations. A gamma analysis was performed on each sample following the drying and removal of rocks and clams. The samples were collected from the locations listed below.

Location 208	=	Discharge Canal (0.5 mi. S)
Location 210	=	Ebenezer Access (2.3 mi. SE)
Location 215	=	River Pointe - Hwy 49 (4.2 mi. NNE)

A.7 FISH

Semiannual samples were collected at each of two locations. A gamma analysis was performed on the edible portions of each sample. Boney fish (i.e. Sunfish) were prepared whole minus the head and tail portions. The samples were collected from the locations listed below.

Location 208 = Discharge Canal (0.5 mi. S)
Location 216 = Hwy 49 Bridge (4.0 mi. NNE)

A.8 DIRECT GAMMA RADIATION (TLD)

Thermoluminescent dosimeters (TLD) were collected quarterly at forty locations. A gamma dose rate was determined for each TLD. The TLDs were placed as indicated below.

* An inner ring of 16 TLDs, one in each meteorological sector in the general area of the site boundary.

* An outer ring of 16 TLDs, one in each meteorological sector in the 6 to 8 kilometer range.

* The remaining TLDs were placed in special interest areas such as population centers, residential areas, schools, and at three control locations.

TLD locations are listed in Table 2.1-A.

A.9 FOOD PRODUCTS

Monthly samples were collected when available during the harvest season at one location. A gamma analysis was performed on each sample. The samples were collected from the location listed below.

Location 253 = Irrigated Gardens (2.1 mi. SSE)

A.10 GROUND WATER

Grab samples were collected quarterly from residential wells at each of two locations. A gamma analysis, low-level I-131 analysis, and a tritium analysis were performed on each sample. The samples were collected from the locations listed below.

Location 252 = Residence (0.7 mi. SW)
Location 254 = Residence (0.8 mi. N)

A.11 ANNUAL LAND USE CENSUS

An Annual Land Use Census was conducted to identify within a distance of 8 kilometers (5.0 miles) from the station, the nearest location from the site boundary in each of the sixteen meteorological sectors, the following:

* The Nearest Residence

* The Nearest Meat Animal

* The Nearest Garden greater than 50 square meters or 500 square feet

* The Nearest Milk-giving Animal (cow, goat, etc.)

The census was conducted July 20 - August 16, 1995 and the results are shown in Table 3.12-A.

V. PROGRAM IMPROVEMENTS

Trending of both air sampler and water sampler site locations is performed for continuous identification of any problems impacting the sample deviation rate of the Radiological Environmental Monitoring Program (REMP).

Each air site has been evaluated for correct grounding, proper voltage range and the equipment requirement to install surge and lightning suppressers. Modifications based upon the site evaluations will be made to the air sampler sites in 1996.

Various equipment upgrades and purchases were made in 1995 to enhance the Radiological Environmental Monitoring Program for Catawba Nuclear Station. A thorough description of the purchases and upgrades to the environmental program may be found in the "Sampling and Deviation Reduction Plan for 1995 and 1996" in Appendix C, Section C.3.

APPENDIX B

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SUMMARY OF RESULTS 1995

Note: Locations, respective sectors and distances are included in Section 2.1, Site Descriptions

Environmental Radiological Monitoring Program Summary

Name of Facility : CATAWBA NUCLEAR STATION
Location of Facility : COUNTY, S.C.
Time Report Generated : 11-JAN-1996 13:50:42
Docket Number : 50-413,414
Reporting Period : 1-JAN-1995 through 31-DEC-1995
Database Name : $DISK1:[USER.ASC]CATAWBA NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean: Name, Distance and Direction; Location Code	Location with Highest Mean: Mean (Fraction) Range	Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
AIR PARTICULATE (PCI/M3)						217 (10.0 Mi SSE)	
5 LOCATIONS	MN-54 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-58 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	FE-59 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-60 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZN-65 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	NB-95 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZR-95 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	I-131 258	7.00E-02	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-134 258	5.00E-02	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-137 258	6.00E-02	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	BALA-140 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	BETA 258	1.00E-02	3.67E-02(206/ 206) 3.63E-03-- 0.20	212 (3.3 Mi E)	4.88E-02(52/ 52) 1.51E-02-- 0.20	3.23E-02(52/ 52) 1.49E-02-- 8.31E-02	0

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements
If LLD is equal to 0, then LLD is not required by Technical Specifications

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AIR RADIOIODINES (PCI/M3)						217 (10.0 Mi SSE)	
5 LOCATIONS	MN-54 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-58 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	FE-59 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-60 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZN-65 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	NB-95 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZR-95 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	I-131 258	7.00E-02	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-134 258	5.00E-02	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-137 258	6.00E-02	2.07E-02(6/ 206) 4.75E-03-- 5.20E-02	200 (0.6 Mi NNE)	2.59E-02(2/ 50) 2.11E-02-- 3.07E-02	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	BALA-140 258	0.00E+00	0.00E+00(0/ 206) 0.00E+00-- 0.00E+00		0.00E+00(0/ 50) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only
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BROAD LEAF VEGET (PCI/WET/KG)						217 (10.0 Mi SSE)	
4 LOCATIONS	MN-54 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	CO-58 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	FE-59 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	CO-60 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	ZN-65 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	NB-95 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	ZR-95 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	I-131 36	60.	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	CS-134 36	60.	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	CS-137 36	80.	36. (4/ 27) 19. -- 59.	201 (0.5 Mi NE)	36. (4/ 9) 19. -- 59.	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0
	BALA-140 36	0.00E+00	0.00E+00(0/ 27) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0

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CROPS (PCI/WET/KG)						NO CONTROL LOCATION	
1 LOCATION	MN-54 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CO-58 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	FE-59 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CO-60 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	ZN-65 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	NB-95 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	ZR-95 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	I-131 9	60.	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CS-134 9	60.	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CS-137 9	80.	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	BALA-140 9	0.00E+00	0.00E+00(0/ 9) 0.00E+00-- 0.00E+00		0.00E+00(0/ 9) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0

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DRINKING WATER (PCI/LITER)						218 (13.5 Mi N)	
2 LOCATIONS	ANAL1-LL 26	1.0	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ANAL2-LL 26	1.0	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	MN-54 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-58 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	FE-59 26	30.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-60 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZN-65 26	30.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	NB-95 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZR-95 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	I-131 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-134 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-137 26	18.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	BALA-140 26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0

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DRINKING WATER (PCI/LITER)				214 (7.3 Mi NNE)		218 (13.5 Mi N)	
2 LOCATIONS	BETA 26	4.0	4.8 (11/ 13) 2.3 -- 7.8		4.8 (11/ 13) 2.3 -- 7.8	4.5 (11/ 13) 1.7 -- 13.	0
DW TRITIUM (PCI/LITER)				214			
2 LOCATIONS	H-3 8	2.00E+03	4.28E+02(1/ 4) 4.28E+02-- 4.28E+02		4.28E+02(1/ 4) 4.28E+02-- 4.28E+02	2.21E+02(1/ 4) 2.21E+02-- 2.21E+02	0

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements
If LLD is equal to 0, then LLD is not required by Technical Specifications

Environmental Radiological Monitoring Program Summary

Name of Facility : CATAWBA NUCLEAR STATION
Location of Facility : COUNTY, S.C.
Time Report Generated : 11-JAN-1996 13:50:42
Docket Number : 50-413,414
Reporting Period : 1-JAN-1995 through 31-DEC-1995
Database Name : $DISK1:[USER.ASC]CATAWBA NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean Name, Distance and Direction Location Code / Mean (Fraction) Range	Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
FISH (PCI/WET/KG)					216 (4.0 Mi NNE)	
2 LOCATIONS	MN-54 12	1.30E+02	20. (1/ 6) 20. -- 20.	208 (0.5 Mi S) 20. (1/ 6) 20. -- 20.	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	CO-58 12	1.30E+02	1.10E+02(3/ 6) 14. -- 2.54E+02	208 1.10E+02(3/ 6) 14. -- 2.54E+02	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	FE-59 12	2.60E+02	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	CO-60 12	1.30E+02	92. (1/ 6) 92. -- 92.	208 92. (1/ 6) 92. -- 92.	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	ZN-65 12	2.60E+02	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	NB-95 12	0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	ZR-95 12	0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	I-131 12	0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	CS-134 12	1.30E+02	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0
	CS-137 12	1.50E+02	30. (4/ 6) 25. -- 39.	208 30. (4/ 6) 25. -- 39.	15. (1/ 6) 15. -- 15.	0
	BALA-140 12	0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0.00E+00(0/ 6) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
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Environmental Radiological Monitoring Program Summary

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Location of Facility : COUNTY, S.C.
Time Report Generated : 11-JAN-1996 13:50:42
Docket Number : 50-413,414
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Database Name : $DISK1:[USER.ASC]CATAWBA NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean Name, Distance and Direction Location Code	Location with Highest Mean Name, Distance and Direction Mean (Fraction) Range	Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
GROUND WATER (PCI/LITER)						NO CONTROL LOCATION	-
2 LOCATIONS	H-3 8	2.00E+03	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	MN-54 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CO-58 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	FE-59 8	30.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CO-60 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	ZN-65 8	30.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	NB-95 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	ZR-95 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	I-131 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CS-134 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	CS-137 8	18.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0
	BALA-140 8	15.	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00		0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 0) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
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Environmental Radiological Monitoring Program Summary

Name of Facility : CATAWBA NUCLEAR STATION
Location of Facility : COUNTY, S.C.
Time Report Generated : 11-JAN-1996 13:50:42
Docket Number : 50 413,414
Reporting Period : 1-JAN-1995 through 31-DEC-1995
Database Name : $DISK1:[USER.ASC]CATAWBA NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean: Name, Distance and Direction; Location Code	Location with Highest Mean: Mean (Fraction) Range	Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
MILK (PCI/LITER)						221 (12.3 Mi NW)	
3 LOCATIONS	MN-54 78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CO-58 78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	FE-59 78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CO-60 78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	ZN-65 78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	NB-95 78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	ZR-95 78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	I-131 78	15.	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	LLI-131 78	1.0	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CS-134 78	15.	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CS-137 78	18.	8.6 (1/ 52) 8.6 -- 8.6	209 (7.0 Mi SSW)	8.6 (1/ 26) 8.6 -- 8.6	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	BALA-140 78	15.	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements
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Environmental Radiological Monitoring Program Summary

Name of Facility : CATAWBA NUCLEAR STATION
Location of Facility : COUNTY, S.C.
Time Report Generated : 11-JAN-1996 13:50:42

Docket Number : 50-413,414
Reporting Period : 1-JAN-1995 through 31-DEC-1995
Database Name : $DISK1:[USER.ASC]CATAWBA NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Frac) Range	Location with Highest Mean: Name, Distance and Direction; Location Code	Location with Highest Mean: Mean (Fraction) Range	Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
SEDIMENT (PCI/DRY/KG)						215 (4.1 Mi NNE)	
3 LOCATIONS	MN-54 6	0.00E+00	41. (1/ 4) 41. -- 41.	208 (0.5 Mi S)	41. (1/ 2) 41. -- 41.	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	CO-58 6	0.00E+00	2.54E+02(2/ 4) 1.38E+02-- 3.70E+02	208	2.54E+02(2/ 2) 1.38E+02-- 3.70E+02	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	FE-59 6	0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00		0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	CO-60 6	0.00E+00	3.41E+02(2/ 4) 1.05E+02-- 5.76E+02	208	3.41E+02(2/ 2) 1.05E+02-- 5.76E+02	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	ZN-65 6	0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00		0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	NB-95 6	0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00		0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	ZR-95 6	0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00		0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	I-131 6	0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00		0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	CS-134 6	1.50E+02	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00		0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	CS-137 6	1.80E+02	85. (2/ 4) 37. -- 1.33E+02	208	85. (2/ 2) 37. -- 1.33E+02	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0
	BALA-140 6	0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00		0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0.00E+00(0/ 2) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only
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Environmental Radiological Monitoring Program Summary

Name of Facility : CATAWBA NUCLEAR STATION
Location of Facility : COUNTY, S.C.
Time Report Generated : 11-JAN-1996 13:50:42
Docket Number : 50-413,414
Reporting Period : 1-JAN-1995 through 31-DEC-1995
Database Name : $DISK1:[USER.ASC]CATAWBA NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean: Name, Distance and Direction; Location Code	Location with Highest Mean: Mean (Fraction) Range	Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
SURFACE WATER (PCI/LITER)						215 (4.1 Mi NNE)	
3 LOCATIONS	MN-54 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-58 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	FE-59 39	30.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-60 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZN-65 39	30.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	NB-95 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZR-95 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	I-131 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-134 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-137 39	18.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	BALA-140 39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
SW TRITIUM (PCI/LITER)						215 (4.1 Mi NNE)	
3 LOCATIONS	H-3 12	2.00E+03	4.17E+03(5/ 8) 3.48E+02-- 1.06E+04	208 (0.5 Mi S)	5.13E+03(4/ 4) 9.02E+02-- 1.06E+04	2.89E+02(1/ 4) 2.89E+02-- 2.89E+02	0

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements
If LLD is equal to 0, then LLD is not required by Technical Specifications

Environmental Radiological Monitoring Program Summary

Name of Facility : CATAWBA NUCLEAR STATION
Location of Facility : YORK COUNTY, S.C.
Time Report Generated : 17-JAN-1996 15:58:04
Docket Number : 50-413,414
Reporting Period : 1-JAN-1995 through 31-DEC-1995
Database Name : $DISK1:[USER.ASC]CNS95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean Name, Distance and Direction Location Code	Location with Highest Mean Mean (Fraction) Range	Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
DIRECT RAD-TLD (mR/QUARTER)				206 (0.7 Mi WNW)		*	
40 LOCATIONS	mR/QTR 159	0.00E+00	24. (147/ 147) 14. -- 37.		28. (4/ 4) 27. -- 31.	20. (12/ 12) 15. -- 24.	0

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements
If LLD is equal to 0, then LLD is not required by Selected Licensee Commitments
* Control Locations: 217 (10.0 Mi SSE)
247 (7.5 Mi ESE)
251 (9.8 Mi WNW)

Catawba Nuclear Station
Sites 208-1S, 208-2S, 208-3S
Shoreline Sediment Results for 1995 Sample Year

208-1S The activities for 208-1S were taken from the APPENDIX B, Page 10

	ALL 1995	MEAN VALUE	Indicates Highest Mean for Sample Medium (H)
Mn54	41.00	41.00	
Co58	254.00	254.00	
Nb95			
Sb125			
Co60	341.00	341.00	
Cs137	85.00	85.00	H
Sn113			
Co57			

208-2S

	1Q95	2Q95	3Q95	4Q95		
Mn54		42.70	43.10	281.00	122.27	H
Co58	77.70	561.00	357.00	4310.00	1326.43	H
Nb95				113.00	113.00	H
Sb125		73.70	58.60	200.00	110.77	
Co60		332.00	311.00	2190.00	944.33	H
Cs137	27.10	41.70	74.30	78.10	55.30	
Sn113				71.10	71.10	H
Co57				36.90	36.90	H

208-3S

	1Q95	2Q95	3Q95	4Q95		
Mn54	37.10	41.20		151.00	76.43	
Co58	345.00	776.00	232.00	1724.00	769.25	
Nb95				61.20	61.20	
Sb125	115.00	177.00	67.80	234.00	148.45	H
Co60	297.00	417.00	235.00	935.00	471.00	
Cs137	103.00	91.60	43.50	58.80	74.23	
Sn113						
Co57						

Catawba Nuclear Station

Site 208 Fish (Predator, Forager, Bottom Feeder) Results for 1995 Sample Year

208 - Predator (Bass)

	3/29	6/14	9/20	12/6	MEAN VALUE	Indicates Highest Mean for Sample Medium (H)
Mn54						
Co58						
Co60						
Nb95						
Cs137	30.8	20.8	25.1	23.9	67.7	H

208 - Forager (Sunfish)

Mn54	19.70	26.00		32.40	56.50	H
Co58	254.00	385.00	62.60	754.00	890.10	H
Co60	92.50	114.00		169.00	265.50	H
Nb95		13.80			13.80	H
Cs137	25.10				25.10	

208 - Bottom Feeder (Catfish)

Mn54						
Co58		19.90	14.10	151.00	84.30	
Co60						
Nb95						
Cs137	39.00	12.10			45.10	

APPENDIX C

SAMPLING DEVIATIONS
&
UNAVAILABLE ANALYSES

APPENDIX C

CATAWBA NUCLEAR STATION
SAMPLING DEVIATIONS & UNAVAILABLE ANALYSES

DEVIATION & UNAVAILABLE REASON CODES			
BF	Blown Fuse	PO	Power Outage
FZ	Sample Frozen	PS	Pump out of service / Undergoing Repair
IW	Inclement Weather	SL	Sample Loss/Lost due to Laboratory Accident
LC	Line Clog to Sampler	SM	Motor / Rotor Seized
OT	Other	TF	Torn Filter
PI	Power Interrupt	VN	Vandalism
PM	Preventive Maintenance		

C.1 SAMPLING DEVIATIONS

The following deviations from sampling requirements occurred during 1995:

Air Particulate and Air Radioiodines

Location	Scheduled Collection Dates	Actual Collection Dates	Reason	Corrective Action
200	5/31-6/7/95	5/31-6/1/95	PI	Reset breaker and tried to restart sampler. Breaker tripped again. Contacted CNS staff for repairs.
	8/23-8/30/95	8/23-8/27/95	PO	Power was lost to sample station. Notified CNS staff to contact I&E technician.
	11/1-11/8/95	11/1-11/2/95	PO	Reset breaker. Breaker trip probably due to inclement weather.
	11/8-11/15/95	11/8-11/11/95	PO	Reset breaker. Breaker trip probably due to severe thunderstorms on 11/11.
205	4/5-4/12/95	4/5/95	BF	Reason unknown. Replaced fuse and noted incident on sampler tag.
	5/24-5/31/95	5/24-5/28/95	BF	Reason unknown. Replaced fuse and noted incident on sampler tag for sampler #8.
217	2/8-2/15/95	2/8-2/11/95	BF	Reason unknown. Replaced air sampler # LVAS 17.
	5/24-5/31/95	5/24-5/30/95	BF	Reason unknown. Replaced fuse and noted incident on sampler tag for sampler #1191.

Drinking Water

Location	Scheduled Collection Dates	Actual Collection Dates	Reason	Corrective Action
214	2/15-3/1/95	3/1/95	PS	No water flowing to sampler. Collected grab sample.
	3/1-3/15/95	3/8-3/15/95	OT	Valve to water supply was closed. Reopened valve. Collected an abbreviated sample.
218	8/16-8/30/95	8/30/95	VN	Drain valve was open and there was no water in tank. Closed drain. Collected grab sample.

Surface Water

Location	Scheduled Collection Dates	Actual Collection Dates	Reason	Corrective Action
208	3/1-3/15/95	3/15/95	PS	Collected grab sample. (a)
	3/15-3/29/95	3/29/95	PS	Collected grab sample.
	3/29-4/12/95	4/12/95	PS	Collected grab sample.
	4/12-4/26/95	4/26/95	PS	Collected grab sample.
	4/26-5/10/95	5/10/95	PS	Collected grab sample.
	5/10-5/24/95	5/24/95	PS	Collected grab sample.
	5/24-6/7/95	6/7/95	PS	Collected grab sample.
	6/7-6/21/95	6/21/95	PS	Collected grab sample.
	6/21-7/5/95	7/5/95	PS	Collected grab sample.
	7/5-7/19/95	7/19/95	PS	Collected grab sample.
	7/19-8/2/95	8/2/95	PS	Collected grab sample.
215	7/19-8/2/95	8/2/95	PS	Collected grab sample. Pump was not working. Notified CNS staff to initiate work request.
	8/2-8/16/95	8/11-8/16/95	PS	Collected abbreviated sample. Pump wiring was defective. Work request was completed on 8/11/95 and equipment was returned to service.

(a) Following repeated problems with Site 208 sampler operation, a work plan was created and initiated 3/15/95. Maintenance scheduling team reviewed location week of 4/1/95. Following discussions between Engineering Staff and Radiation Protection Staff, the decision was made to completely renovate the sampler/pier location. Work on the plans and materials began 4/20/95. Additional work control steps were taken to assure proper parts, drawings and scheduling. Completion of all construction was accomplished 7/15/95 and following testing and reordering electrical components, Site 208 was returned to service on 8/2/95.

C.2 UNAVAILABLE ANALYSES

The following unavailable analyses occurred during 1995:

Air Particulate and Air Radioiodines

Location	Scheduled Collection Dates	Reason	Corrective Action
200	6/7-6/14/95	IW	Water collected in receptacle causing breaker to continuously trip. Outlet will be waterproofed.
	8/30-9/16/95	PO	The breaker had tripped. Reset breaker.

TLD

Location	Scheduled Collection Dates	Reason	Corrective Action
233	3/30-6/29/95	VN	Branch of tree had been trimmed and TLD was missing. Replaced with 3rd Quarter TLD.

C.3 SAMPLE DEVIATION AND UNAVAILABLE REDUCTION PLAN

The sampling deviation and reduction plan was initiated by the REMP working group on 9/25/95. Items were identified to be addressed and/or implemented to reduce the number of sample deviations and unavailable samples. Table C.3-A identifies the plan's schedule and activities.

TABLE C.3-A
Deviation Reduction Plan Overview

Activity Description	Date Initiated	Target Date Completion	STATUS CODE
Purchase additional air samplers for dual air monitoring	10/5/95	10/5/95	C
Purchase "ISCO" portable composite water samplers	10/5/95	10/5/95	C
Consistent Deviation/Unavailable codes implemented	10/5/95	10/5/95	C
Air site electrical modifications	10/9/95	6/1/96	I
Air site grounding	10/10/95	6/1/96	I
Deviation section of AEOR to include more detail	10/17/95	11/15/95	C
Modify air sampler housing to accommodate dual samplers	1/1/96	3/31/96	P

P = Pending, I = In Process, C = Completed

PURCHASE ITEMS

Table C.3-B lists items for the environmental monitoring program that were purchased to improve and enhance the environmental sample collection program. Included are sampling equipment and supplemental sampling items.

TABLE C.3-B
Deviation Reduction Plan Equipment Purchases

Sample Stream	ITEM DESCRIPTION	ITEM QUANTITY
AIR	1/3 HP low volume air sample pump	8
AIR	Elapsed time meter, 0.0 - 999.9 hours (may be reset)	8
AIR	NEMA conduit box for elapsed time meter	8
WATER	"ISCO" model 3710 portable composite sampler	2
WATER	Model 913 power converter & battery charger, 120/60	2
WATER	100' of 3/8" bulk vinyl suction tube	2
WATER	3/8" vinyl suction line accessory kit	2
WATER	Weighted 3/8" stainless steel strainer	2
WATER	Silicone rubber pump tube, 50' roll	1
WATER	Model 934 nickel-cadmium rechargeable battery pack	1

SITE MODIFICATIONS

AIR SITES - Air sampler modifications will include the following:

1 - Purchase additional air samplers for dual air monitoring to be implemented at each environmental air monitoring site. The additional samplers will be housed in existing sample houses.

2 - Upgrade electrical equipment at each air sample site. This will include the installation of lightning arrestors, waterproof outlets, GFCI breakers, and surge protectors.

3 - Grounding of air sample houses and air sample cages to < 0.025 ohms.

4 - Modify air sample houses to allow for sufficient heat removal during summer months. Currently, each air sample house is cooled by a continuously operating electrical cooling fan. After electrical modifications and grounding are completed, the sample houses will be physically altered to allow for natural cross-ventilation to occur to supplement the electrical fan. Sample house door hinges on both sides of the house will be moved and reversed to allow for a small, free, open air space to be created. This modification will create additional heat removal capability during the summer months while still protecting the air samplers inside the house from the environment (i.e. wind, rain, snow).

Sample site visits and evaluations for all of Catawba's air sampling sites was performed on 12/11/95. The purpose was to identify the exact electrical equipment upgrade needs for each site. Results of the site visits are displayed in Table C.3-C.

TABLE C.3-C
Deviation Reduction Plan
Air Site Upgrade Equipment Purchases

SPECIFIC UPGRADE ITEM	200	201	205	212	217
Ground Rod w/clamps 5/8 x 8					1
2/0 Bare Copper ft	10'		5'		10'
20 AMP GFCI Breaker			2		
WP Male Plug Woodhead	4	4	4	4	4
Multioutlet Box (4) WP receptacles	1	1	1	1	1
Vertical Fence Grd clamp	1, 4"				1, 3"
Horizontal Fence Grd. Clamp					
Equip. Grd. Clamp 2/0	1	1			1
Single phase panel arrestor SDSA1175	1	1			
Surge suppresser	1	1		1	1
Ground Clamp	1	1			

WATER SITES - Water sampler modifications will include the following:

1 - Purchase portable water compositors (ISCO) for utilization when water sites are undergoing preventive maintenance or repair.

2 - Upgrade electrical supply at each surface water site (if necessary) to accommodate the ISCO portable water composite samplers.

APPENDIX D

ANALYTICAL DEVIATIONS

No analytical deviations were incurred for the 1995 Radiological Environmental Monitoring Program.

APPENDIX E

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM RESULTS

1995

This appendix includes all of the sample analysis reports generated from each sample medium for 1995. Appendix E is located separately from this report and is permanently archived at Duke Power Company's Environmental Center radiological environmental master file, located at the McGuire Nuclear Station Site in Huntersville, North Carolina.